E04815

MODERN HORSE MANAGEMENT

Photo: G. H. Parsons

THOROUGHBRED : GALLINULE

MODERN HORSE MANAGEMENT

By

Lieut.-Colonel REGINALD S. TIMMIS, D.S.O.

ROYAL CANADIAN DRAGOONS, LATE COMMANDANT AND CHIEF INSTRUCTOR ROYAL CANADIAN CAVALRY SCHOOL

Author of "Riding and Schooling," "Lameness in Horses," "Conformation and Appointments," etc. Governor and Member of the Council of the Arab Horse Society; Member of the Council, Canadian Hunter, Saddle and Light-Horse Society; Life Member, Hunters Improvement Society, etc.

THIRD EDITION

WITH 80 PHOTOGRAPHS

CASSELL AND COMPANY, LIMITED
LONDON, TORONTO, MELBOURNE AND SYDNEY

First published *February*, 1915
Second Edition - - 1929
Third Edition (Revised) 1947

Printed in Great Britain

THIS BOOK
IS MOST RESPECTFULLY DEDICATED
BY PERMISSION
TO
COLONEL HIS ROYAL HIGHNESS THE DUKE OF GLOUCESTER
K.G., P.C., K.T., K.P., G.M.B., G.C.M.G., G.C.V.O.

PREFACE TO THE FIRST EDITION

By the late Prof. ALFRED SAVIGEAR

(Formerly Chief Riding Instructor to R.M. College, Staff College, R.H.A., and 17th Lancers).

IN placing this book before the public, the Author is imparting much information of great value to the horseman and horse owner, and is very greatly helping the lot of our friend the horse. It is for this latter reason that the Author has compiled the work. I am extremely pleased to find that an old pupil of mine has given the time and study necessary to produce such a book.

I strongly commend the notes on riding. Were it not for his ability, and practical and calm methods adopted in riding young horses, I would never have allowed him to ride so many of my young horses, and to assist me in my school at Earl's Court. May I emphasize the three important qualifications for a horseman—good hands, good seat, and a perfect control of temper when working with horses.

The Press has rightly acknowledged the Author as an authority on horse matters, and I was delighted to see that he had lectured with such success in many large cities, and had included H.R.H. the Duke of Connaught among his hearers. His remarks on training are the result of minute study and practical experience.

My advice to conceited riders: clear your mind and practise on sound principles. To the unhealthy I strongly commend the prescription of the old family physician—horseback exercise. But riding must be taught by one who knows how. Do not despise the school. I have had fifty-six years in it and across country. The subject must be studied. Money spent on horseback exercise is money well spent; no one who has the opportunity to take such exercise can be at a loss to find something to do.

ALFRED SAVIGEAR.

CONTENTS

PAGE

INTRODUCTION xix

CHAPTER I

HISTORY OF THE HORSE

Etymology—Geology and the Horse—Zoological Position of the Horse—A Brief History—The "Thoroughbred"—Some Race Records—The Bend Or Line—The World's Horses . . 1

CHAPTER II

PSYCHOLOGY OF THE HORSE

The Horse's Mind—Intelligence—Love for Man—Special Characteristics—Power of Communication—Homing Instincts—Use of the Voice—Memory—Outward Signs—Viciousness—Superiority of Man — Obedience — Reactions — Caresses — Associations—Fear—Punishments 19

CHAPTER III

THE PRINCIPLES OF TRAINING

Hints for the Trainer—Feeding and Training—Exercise—Lunging—Mouthing—Mounting—Action Lessons—The Use of Music—Standing—Indications—Bitting—Mental Influence—Jumping—Circus Horses 44

CHAPTER IV

CONDITION AND EXERCISE; RIDING, DRIVING AND TRANSPORTATION

What Condition Means—Conditioning Horses—Condition Food and Powders—Exercise—Rest—Long-distance Rides—Lending

PAGE

Horses—Care of Horse on Road—Horses in Camp—Hobbles and Knee-Halters—Transport by Rail and Sea—Swimming Horses—On Riding—Seats—Hands—Show Jumping—Spurs and Whips—On Side-Saddle Riding—Paces—Records—Conformation of Saddle-horse—On Driving—Whips—Holding the Reins in Driving—Hints on Tandem and Four-in-Hand *Driving—The Reins Under the Tail—Overloading—Type of* Harness Horse—Treatment of Bad Habits—Refusers—Balking or *Jibbing* — Kicking — Rearing — *Pulling* — Runaways —Tying Up Horses 58

CHAPTER V

SADDLES AND SORE BACKS; BITTING, DRAUGHT, HARNESS

Structure of the Back—Position of Saddle—Types of Backs—Distribution of Weight—Pressure—Saddles—Fitting the Saddle—Saddle Blanket or Numnah—Girths—Stirrups—Stirrup Leather—Sore Backs, Their Prevention and Cure—Galls—Cure of Galls—Bridles—Bits and Bitting—Types of Bits—Cold Bits—Martingales—On Draught—Weight and Balance—The Pole—Anatomy of the Shoulder—Collars—Breast-Collars—Collar Injuries and Sore Shoulders—Whiffle-Tree—Loads—Harnessing—The Harness—Training Gear—Care of Saddlery and Harness—Moths—Clothing—Cleaning of Clothes—Bearing Reins—On Photographing Horses 96

CHAPTER VI

FEEDING AND WATERING

Stable Economy—Digestive Organs—Principles of Feeding—Race-horses—Van Horses—Farm Horses—Young Hunters—Feeding after Foaling—Causes of Thinness—Nosebags—Stowage of Forage—Composition of Food—Vitamines—Oats—Maize—Barley—Rye —Wheat—Beans—Peas—Rice—Cleaning Grain—Roots —Bran — Linseed — Oatmeal — Sugar — Salt—Green Feed—Grazing—Pasture—Hay—Hay Grasses—Gorse—Off Feed—Watering 136

CONTENTS

CHAPTER VII

PAGE

GROOMING AND STABLE MANAGEMENT

Theory of Grooming—Method of Grooming—To Test for Good Grooming—Grooms—The Coat—Care of the Legs—Tools—Clothing—Bandages—Rolling—Bedding—Stable Economy—Stopping the Feet—Examining Shoes—Brushing Boots—Knee-Caps—Leading into Stable—Clipping—Trimming—The Forelock—The Mane—Tails—Trimming Tails—Use of Tail—*Panniculus Carnosus*—Nicking Tails—Flies—Docking—Mane and Tail Diseases—Fly-nets—Bad Habits in the Stable—Kicking—Crib-Biting—Crowding in the Stall—Weaving—Biting—Halter-Pulling—Tearing Clothing—When a Horse Refuses to Lie Down—Cruelty 164

CHAPTER VIII

STABLE CONSTRUCTION AND SANITATION

The Circulatory System—Respiratory System—Ventilation—Stable Impurities—Stable Site—Light—Roofs—Walls—Doors and Windows — Floors — Coach-Houses — Drainage — Litter-Shelters — Heating — Stalls and Boxes — Mangers — Water-Troughs—The Loft—Improvements to Old Stables—Precautions Against Fire—Slings—Riding-Schools . . . 209

CHAPTER IX

THE FOOT AND SHOEING

Structure of Foot—Wall—Sole—Bars—Frog—Lateral Cartilages—Growth of the Horn—Mechanism of the Foot—Principles of Shoeing—Preparation of the Foot—Fitting the Shoe—Nails—Nailing on the Shoe—Clips—Calkins—Removing Shoes—Special Shoeing—Tips—Bar Shoes—Feathering—Non-Slipping Shoes—Pavements—Winter Shoes—Common Faults of Farriers—Unshod Feet—Care of Foal's Feet—Pricks—Presses or Binds—Forge Tools—Shoeing Tools—Faulty Feet—Forging—Stum-

PAGE

bling—Contracted Heels—Corns—Sandcrack—Split Hoof—False Quarter—Seedy Toe—Brittle Feet—Treads—Thrush—Acute Laminitis or Founder—Chronic Laminitis . . . 223

CHAPTER X

LAMENESS AND INJURIES; ANTISEPTICS, ANÆSTHETICS; DESTRUCTION

Lameness—Detection of Lameness—Anatomical Terms—Histology of the Tissues—Sprains—Blistering—Firing and Massaging—Branding — Throwing — Twitch — Bone Diseases — Synovial Enlargements—Serous Enlargements—Fractures—Dislocation of the Patella—Antiseptics and Asepsis—Disinfectants—Aseptic Treatment of Wounds and Injuries—Sewing Wounds—*Dressings—Aseptic Precautions in Operating—Abscess—Brushing—Speedy-Cut—Over-Reaching—Broken Knees—Poll-Evil*—Fistulous Withers—Thorns—Swellings—*Burns*—Frost-Bites—Snake-Bites—Lightning and Electric Shocks—Tar on Legs—Anæsthetics—Local Anæsthetics—Humane Destruction 241

CHAPTER XI

THE HORSE IN SICKNESS

The Temperature—The Pulse—The Respiration—Urine—Dung—The Membrana Nictitans—Tracheotomy—Balling—Drenching—Hypodermic Injections—Rectal Injections—Trocar and Cannula—Passing the Catheter—Poultices—Common Ailments—Ulceration of Mouth—Slobbering—Depraved Appetite—Sore Throat—Lampas—Indigestion—Diarrhœa—Spasmodic Colic—Enteritis—Flatulent Colic—Constipation—Worms—Jaundice—Peritonitis—Inflammation of Kidney—Retention of Urine—Diabetes—Azoturia—Clot in Artery—Lymphangitis—Rheumatism—Ophthalmia—Non-Contagious Skin Diseases—Parasitic Skin Diseases—Other Ailments . . . 270

CHAPTER XII

BREEDING; CARE OF MARE AND FOAL; AGE AND TEETH

Duration of Pregnancy—Table of Œstrum—Reproduction Period—Care of In-Foal Mare—Signs of Pregnancy—Foaling Signs—

CONTENTS

PAGE

Birth of the Foal—Care After Birth—Care of the Weanling—Attention to Teeth—Age and the Teeth—How to Examine Teeth—The Tooth—Average Period of Eruption—The Mouth from Birth to Five Years—The Cups—Aged Horses . . 287

CHAPTER

PHARMACOPŒIA AND GLOSSARY

Dosage—Drugs Commonly Used—Useful Compounds—Incompatibility of Drugs—Poisons and Antidotes—Apparatus to be kept in Stable Pharmacy—Purgatives—Weights and Measures—Glossary of Terms 298

INDEX 311

LIST OF PLATES

Thoroughbred: Gallinule . . . . *Frontispiece*

FACING PAGE

Thoroughbred: Bend Or *16*

Thoroughbred: Neyland *16*

Arabian Stallion 17

Thoroughbred: Renown 17

Thoroughbred Hunter: Rathurde 32

Thoroughbred Hunter: Scarlet Rambler . . . 32

The Circus Horse 33

Charger: Peter 33

Thoroughbred: Wildfowler 48

Charger: Kildare 48

Charger: Hercules 49

Police Mount: Quicksilver 49

The Lady Astride 64

The Side Saddle 64

Jumper: Pantin 65

Jumper: Bucephalus 65

Tandem 80

Sporting Tandem in Action 80

Four-in-Hand 80

Bits 81

The Reins: Tandem or Four-in-Hand 81

The Reins: Pair or Single 81

Carriage and Pair 96

Sleigh and Pair 96

Heavy Pair Harness 96

LIST OF PLATES

FACING PAGE

Trotter in Action: Majestic 96

Hackney Pony: Garland 97

Pair in Action 97

Cleveland Bay Coach Horses 112

A Pair of Bays 112

Saddle-Horse: Korosko 113

Saddle-Horse: Copper King 113

Saddle-Horse: Norma 128

Saddle-Horse: Sceptre 128

Trace-High Clipping 129

Thoroughbred: Demi Strome 129

Tail Plaiting 129

Tail Plaiting 129

Team of Percherons 144

Carriage and Pair (Hackneys) 144

Tail Plaiting: Light Horse 145

Pair of Blacks 145

Tail Plaiting: Heavy Horse 145

Clydesdale: Bonnie Buchlyvie 145

Hackney: Findon Grey Shales 160

Grey Percheron 160

Hackney: Peter Shales 160

Tail Plaiting: Heavy Pair 160

Hackney: Knight Commander 161

Team of Percherons in Toronto 161

Eighteen Years' Service 176

Saddle-Pony: Flintsteel 176

Interior of Stables: Stalls 177

Interior of Stables: Loose-Boxes 177

Standardbred Trotter: Ed Winter 192

Standardbred Trotter: Joe Patchen 192

Ringbone and Sidebones 193

Sprained Tendons 193

LIST OF PLATES

FACING PAGE

Sound Normal Foot 193
Spavin 224
Clean Inside Hock 224
Splint 224
Clean Leg 224
Curb 224
Clean Back of Hock 224
Polo Ponies 225
Polo Pony: C. Columbus 225
The King of Spain on a Polo Pony 240
Polo Pony: Aviator 240
Welsh Pony: Grove King Cole II 241
Hackney Pony 241
Clydesdale: Dunure Footprint 272
Clydesdale: Baron O'Buchlyvie 272
Suffolk: Saturn 273
Suffolk: Sudbourne Lassie 273
Percheron: Frank J. 288
Percheron Grade Horse 288
Pair of Percherons 288
Dappled Grey Percheron 288

FOREWORD

THE Author of this very comprehensive work, which is entering upon its Third Edition, has studied at the Army Equitation School at Weedon and has had a wide experience both in England and on the continent of America.

Readers on both sides of the Atlantic will find within its pages matter especially applicable to their own part of the world, as well as much valuable information of general interest to all horse-owners.

It is always good to know the views of others regarding subjects in which we ourselves are interested, and experienced horsemen will appreciate the opportunity of comparing those of Colonel Timmis with their own; they will find it, moreover, a very useful book of reference.

Unfortunately, there are many who think that, unlike other sciences, proficiency in horsemastership can be acquired without study or experience; it is to them that I would especially recommend this book, for ignorance is the cause of poor condition and ill-health and may lead to unintentional cruelty.

It would be difficult to find any subject relating to the care of horses which the Author has omitted to discuss with meticulous attention to detail.

T. H. S. MARCHANT
BRIG.-GEN.

CAVALRY CLUB,
LONDON, W.1.

INTRODUCTION TO THIRD EDITION

SINCE the original edition of this book was sold out, there have been so many horsemen and horse-lovers from all parts of the world inquiring for copies, that I have decided to place another edition on the market—but one revised throughout. This has been no mean task, as it has been my wish to add many new subjects, to bring all subjects as thoroughly up to date as possible, and at the same time, in order to keep the size of the book down to reasonable proportions, I have eliminated many of the deeper scientific discourses.

As the book is intended as a guide to the care of the horse, it does not appear to be essential to enter too deeply into scientific details, except so far as it is necessary in some cases to explain the reasons for certain practices.

My chief reasons for offering this revised edition are: to help our friend the horse; to increase the interest in horses, and thereby to benefit the health of the civilized community in these days of mechanization, when people take less and less real exercise; and in consideration of the economic factor. Millions have been thrown away in the past owing to the improper care of horses.

The horse in the past has played a tremendous rôle in history; and in no country more so than in England and the Empire.

The national character of England has been largely influenced by pursuits in which the horse has been associated.

Chivalry, the synonym of courtesy, knightly valour and gentlehood, owes its origin to the horse.

It was by means of the horse, whose form has been depicted on Babylonian, Assyrian and Persian monuments, that man became civilized—his civilization came about by his art in chevalization.

There are many who little realize the tremendously important part that the horse plays in the social life of a progressive nation. As Colonel Geoffrey Brooke so aptly says in his latest book: "Love of the horse is a common bond of fellowship, and many are the greetings and renewals of friendship to be made at a meet." And as A. E. W. Mason says in one of his best novels: "Amongst the life interests of people like myself an enormous place is occupied by the horse. Horses keep half the country houses open and make the very best of summers just a pleasant overture to the winter."

And for hunting in particular, let me quote from the London *Live Stock Journal*: "Solely from the pecuniary point of view there is no sport in the country that circulates so vast an amount of money, nor is there any amusement that helps to support so many different trades throughout the land."

Happily, many of the ill-cared-for horses will be replaced by the cheap automobile, and in future we shall see fewer and fewer overworked, abused and under-fed horses. The horses that remain, and many there will be, for commercial purposes, will remain for economic reasons; and economically these horses must be cared for in as up-to-date methods as possible. But the great future of the horse, at any rate the light horse, will be for purposes of pleasure.

In war, for many generations at any rate, the horse will be indispensable; as Lord Haig said, shortly before his death: "It is only by utilizing the horse and equipping our mounted troops properly are we likely to take advantage of modern weapons." The efficiency of an army depends on its mobility; mobility depends so much on the fitness and activity of its horses.

How closely is every fine character of a nation allied to sportsmanship; and does not the horse play a grand part in the sport of a nation? Britain in the past has always excelled in sport, because she enjoys games, and has an inborn love for horses, and the nation has an instinct for them. Nations do not become great by deliberately taking thought, but by responding to their instincts.

"Wholesome sport is a liberal form of war, stripped of its compulsions and malignity; a rational art and the expression of civilized instinct."

Amongst Britons and their descendants in all parts of the world we find a natural love for horses, and there is no question that this is closely associated with honour, respect, chivalry, good manners and unselfishness.

As my friend, the late Walter Winans, so aptly put it: "The man who looks upon the horse as so much haulage power would rather jump around with an empty petrol can in his arms than dance with a pretty girl."

To the student of history, and the horse lover, Chapter I will be of interest. I have endeavoured briefly to trace the history of the horse from earliest time. The subject of psychology and training is gone into, in considerable detail, in Chapters II and III, as it is one of vital importance to the horseman. Chapter IV deals with the horse out of doors—at work and exercise. Chapter V to everything appertaining to his harness; and notes on bitting and the photographing of horses have been added. The important subject of correct feeding is dealt with in Chapter VI. In Chapter VII, stable management, trimming, stable habits and cruelty are dealt with at length. Chapter VIII deals with stable construction and sanitation. Chapter IX with the foot and shoeing. Chapter X with lameness and injuries; antiseptics and anæsthetics, and humane destruction. In Chapter XI brief advice is given on the horse in sickness. In Chapter XII, breeding, care of the mare and foal, age and the teeth are dealt with. And Chapter XIII concludes with a brief list of drugs, weights and measures, and a glossary of terms used in the text. An index has been added to permit ready reference to any of the numerous subjects dealt with

INTRODUCTION

I offer my sincerest thanks to those who have helped me in taking many of the photographs and who have allowed their horses to be photographed; and also to Lord Richard Nevill, *C.M.G., C.V.O., Colonel Geoffrey Brooke, D.S.O., M.C.*; and Colonel F. McTaggert, D.S.O., for valuable help; and to my sister and twin brother, to Mr. R. S. Summerhays, Editor of *Riding*, to Mr. Sam Marsh, and to many other good friends and horse lovers for help in completing this book.

I wish to thank Major-General Sir Richard Howard-Vyse, K.C.M.G., D.S.O., and Brig.-General T.H.S. Marchant, D.S.O., of the Institute of the Horse and Pony Club, for assisting me with this third edition.

Sapientiam ac eruditionem stulti spernunt.

R. S. T.

Military H.Q.,
Toronto.

THE HORSE

Here's a toast for all who love
Courage, strength and beauty;
Whose simple creed is play the game,
Ride straight and do your duty.

A toast to him who never failed
In wagon, cart or limber;
Whose gallant spirit never quailed
'Fore line of guns or timber.

To him whose heart knows no defeat
In hunting field or battle,
On classic course, at jungle meet,
Or turning maddened cattle.

A toast to him who'll always share,
Your pleasures, wars and labour;
The "view halloa" or trumpet's blare,
Lance, polo-stick, or sabre.

So lift your glass and honour him—
Man's staunchest friend and treasure,
As true as steel, as kind as love,
In action or at leisure.

He lives in memories dear and far,
Of noble deeds in peace and war,
He paid the price for what we are—
GENTLEMEN—THE HORSE!

MODERN HORSE MANAGEMENT

CHAPTER I

HISTORY OF THE HORSE

AS horsemanship necessarily demands interest—in fact, a first-class horsemaster must have a great love for horses—it is not out of place to include, in this manual on the modern care of the horse, a brief history of the horse from its earliest known days.

Etymology of Horse.—The English word is derived from the Anglo-Saxon *Hors*, meaning swift. The Latin word *Equus* and the Greek word *Hippos* imply the same meaning. Another Greek word for horse is *Kaballos*, which is similar to the Latin *Caballus*, the Spanish *Caballo*, the Italian *Cavallo* and the French *Cheval*. The male is the stallion, French *étalon*, Italian *stallone*. The female is the mare, from the Anglo-Saxon *myre* or *mere*.

From the French *Cheval* we get Chivalry, Chevalier; and from the Spanish *Caballo*, we get Cavalry, Cavalier.

Geology and the Horse.—The earliest traces of the horse's geological ancestors reveal a small fox-like quadruped that walked on four digits on each foot and had a fifth digit that did not reach the ground. This animal was known as the Eohippus and existed in the Lower Eocene Period, which, geologists tell us, was long before the formation of the Alps or Pyrenees, and when the Rocky Mountains were only a few thousand feet high.

The Tertiary, or uppermost epoch of geological history, is divided into five periods: the Eocene, Oligocene, Miocene, Pliocene and Pleistocene (or most recent geological period).

In the Lower Eocene Period lived the Eohippus or Hyracotherium; it was eleven inches in height, resembled a fox and had four toes on each foot with a rudimentary fifth toe. Its origin was in England and Western Europe, whence it migrated across the European and Asiatic Continents, across the Bering Strait to the American Continent and to New Mexico.

In the Middle Eocene Period lived the Plagiolophus, or Orohippus, which was a little larger, but similar in shape.

In the Oligocene Period we find the Mesohippus, which had three toes on the ground and was about half the height of the present light horse. This animal has been found in fossil form in Central China, South Dakota and Montana.

In the next, or Miocene, Period, we find the Merychippus or Protohippus, which had one big weight-bearing toe with two side-toes an inch or more off the ground. He was the size of a small Shetland pony.

Then comes the Hipparion (Greek = pony), or Pleohippus, which lived in the Pliocene Period, of about 10 to 11 hands in height, with one main digit and two side ones that reached to the centre of the pastern, but were well imbedded in the main foot.

And lastly comes the *Equus Caballus*, or modern horse, whose leg consists of one main digit with very rudimentary remains of the second and fourth or side digits, commonly known as splint bones, which only extend two-thirds down the cannon bone and, in aged horses, are generally ossified to the main cannon bone.

The Pleistocene Period is subdivided into the Glacial and the newer recent epochs. Some idea of the colossal age of these equine ancestors can be formed when we consider that the whole of written history, from early Egyptian, Babylonian and Bible records, forms a very small part of the latter part of the recent epoch. Numerous varieties of equine fossils have been found in various parts of the world, and various types of skeletons have been unearthed from more recent formations. For instance, in the Stone Age there were at least three species of wild horse in Western Europe: the Steppe type, similar to the modern Mongolian pony; the Plateau type that lived in England and France; and the Forest type. Remains of this latter were even found at Brighton (England).

A skeleton of a prehistoric horse, the size of a modern Percheron, was found at Monaco.

Zoological Position of the Horse.—The modern horse belongs to the Animal Kingdom, the Chordata Phylum (form), the Vertebrata sub-Phylum, and to the Craniata Division of this sub-Phylum. He belongs to the Mammalia class, the Theria sub-class, and to the Eutheria division of the sub-class; to the Ungulata order (hoofed or nailed), the Perissodactyla sub-order (odd number of digits), the *Equidae* family, the *Equus* genus, and the *Caballus* species. The varieties of species are very numerous; the common ones include: Arab, Thoroughbred, Barb, Suffolk, Percheron, Shire, Clydesdale, Hackney, Standardbred (trotting), Shetland, Welsh, Dale, Cleveland, etc.

The horse is adapted for terrestrial and vegetable diet. The limbs are adapted for carrying the body in terrestrial progression only. It has no collar-bone, the toes are covered with a horny hoof. Its digestion is continuous and it has a small stomach; it can rest for limited periods while standing.

A BRIEF HISTORY OF THE HORSE

Horses and men have been domestic companions and fellow-workers since long before the dawn of history. Figures of the horse may be seen engraved on bone, stone and slate in palæolithic times; whilst perfect skeletons have been discovered from neolithic times. Representations of horses drawing chariots were made on Egyptian monuments 3,000 years before the Christian era. The Libyans domesticated a superior type of horse at least 2,000 years B.C.

The Libyan women of Asia Minor rode horses astride as early as 1800 B.C. The gravestones of the Mycenean Period show sculptured reliefs of pair horses and chariots, about 1500 B.C.

About 1740 B.C. horses were used extensively in Egypt, according to Old Testament records.

The Bible tells us that (in 1650 B.C.) horses for riding and chariots were used in Egypt. The Book of Genesis tells us that wagons, probably drawn by horses, were used in famine-devastated Canaan. Horses were not commonly used as pack animals, corn being laden on asses. Soon after this, however, cavalry formed an important branch of the Egyptian Army. The Book of Exodus tells us that (about 1500 B.C.) the horsemen were the principal strength of the Egyptian army.

Horse races and chariot races were instituted in the Olympic Games in 1450 B.C.

Solomon excelled all the kings of the earth in riches and wisdom. He imported from Egypt 40,000 chariot- and 12,000 saddle-horses for his army.

Did not Job say?

Hast thou given the horse strength? Hast thou clothed his neck
with thunder?
He paweth in the valley, and rejoiceth in his strength: he goeth on to
meet the armed men.
He mocketh at fear and is not affrighted; neither turneth he back from
the sword.

Virgil tells us in the *Georgic* that King Erichthonius of Troy (who lived about 1400 B.C.) was the first to drive a four-in-hand. The Bible tells us that the sheep, the goat and the ass were domesticated before the horse. It must, therefore, have been the beauty of the horse that made him the choice for ceremonial occasions and festivals of all kinds and the subject of art from the very earliest records. The fine arts add to the sum of human happiness and make the world better by the appeal to a higher and finer life. In making this appeal, sculpture has chosen the horse for its subject in many an enduring marble and, later, in many a statue of bronze.

The Libyan bays no doubt made their way to Egypt, Arabia and possibly Greece, although it is probable that Persia and most of Europe got their stock from the dun. Herodotus refers to the "many white horses," and we are told that the Thracian horses were small and not fit to carry men.

Recently in Egypt a mummified horse was discovered buried in a wooden box, with the remains of another horse near by. The date has been set as 1200 B.C. These mummies are in excellent condition. One horse is over 16 hands in height.

The horses used by the Libyans in Asia Minor (1000 B.C.) were dark bay. From Homer we learn that at this period bronze bits were used: previous to this, bone, horn and copper bits had been used. Ancient reliefs of this period show that men often rode without cloth or bit. Homer tells us in the *Iliad* much of interest concerning four-in-hand chariots and expert riding of the period (900 B.C.). Horsemanship had evidently become quite an art in Homer's time.

Chariots were used extensively in ceremonial in King Tutankhamen's time, 1100 B.C.

The hogged manes that are common on the Egyptian and Grecian friezes and drawings are no doubt natural. The earlier horse had a straight mane like the zebra, quagga and bontequagga.

About 900 B.C. horse-cloths were used by the Assyrians to ride on, but not until 400 years later did the Greeks and Macedonians adopt these.

Sculpture in ancient Assyria (7th century B.C.) showed horses as big game. The anatomy was good, but the representations were wooden-like. They were hunted with arrows. Relief sculptures of the same period from the palace of Assurbanipal of Nineveh, showed saddle-horses with gaily decorated leather bridles and metal bits. The horses had large crests and manes. About 700 B.C. Armenia became a large horse-breeding country and supplied horses to Palestine, Persia and Assyria.

Again, we learn from Herodotus that the Greeks about 600 B.C. learned much about horses from the Libyans, who rode astride and drove pairs and four abreast. Horses were raced in the saddle, but were not much used in war as cavalry. The ancient Greek sculpture from the Parthenon at Athens (5th century B.C.) show quite life-like heads, with very thick crests and long, stiff manes standing up straight

Pottery, about 400 B.C., found in the ancient tombs of the Scythians, in South Russia, showed men and women riding bareback, with a rope tied to the halter, hunting big game with hounds. The horses appear to be quite small (14 hands). No spurs were used. About this period the Celts had become good riders and possessed a good cavalry.

The number of cavalry was greatly limited by the great weight of the warrior's shield; many of these being too heavy to carry on horseback.

Herodotus tells us that many of the horses of this period (400 B.C.) were small and carried a long, shaggy coat. From 400 to 300 B.C. the Gauls of Northern Italy were a race of good horsemen.

Xenophon tells us, 400 years before Christ, that jointed bits were used, and that, as early as 600 B.C., the art of bitting had reached an advanced stage. For several centuries B.C. horses were taught to dance to music. Homer asserts that Thracian horses were the finest for riding and chariot work, although riding was not much resorted to in those days. These horses were mostly dappled or of a golden colour, and Achilles's steeds had very heavy manes.

Greek scholars will remember the interesting account Plutarch gives of young Alexander the Great (about 350 B.C.), when he displayed before his father, King Philip of Macedonia, his extraordinary horse-sense. He had no doubt studied the advice of the famous Xenophon, who wrote his work on horses some time before 360 B.C. But Alexander was a true lover of horses. He understood them as few did in those days. Philip had a young, nervous horse brought before the grand stand, but on account of its apparent vicious behaviour ordered it to be taken away. Thereupon young Alexander stood out before the mass and declared that he could ride the horse. He was laughed at by the multitude and severely taken to task by the king. But this had no effect on the young horseman, who repeated his appeals to be allowed to try the horse; he even offered a large sum of money.

The king eventually gave way to his son's desires. Alexander had noticed that the horse (like so many nervous horses of to-day) was so frightened that he shied at his own shadow, so the youth turned the horse facing the sun. After caressing him and soothing his fear, he was able to climb on to the horse's back and ride him at the walk and then at the trot before his amazed audience. King Philip was so overcome by his son's wonderful horsemanship that he wept, and stood up and said that his whole kingdom was not too much for such a lad. This horse was given to Alexander, who named it Bucephalus (Greek *Bous*=ox; *kephale*=head; it having rather a large, broad head). Alexander was able to do anything with this horse, who carried him through many of his great battles when he conquered so much of West and Central Asia, and when he showed himself to be one of the greatest of cavalry leaders as well as horsemen. Bucephalus was eventually wounded in action, but brought his master to safety before dropping dead. He was a Thessalian horse.

In the Greek statuary of the Great Age, we see the Hellenic horses wonderfully life-like. The chariot horses were fine types of carriage horses, standing well over 15 hands. The cavalry horses were much smaller, and suggest a derivation from the Libyan bays rather than the European duns. Xenophon tells us that the horse's back should rise on both sides of the spine, as this is much softer to sit upon and more pleasing to the eye. Xenophon taught the young Hellenic horsemen to become expert at the art.

About 250 B.C., Thucydides tells us that horses in war became lame through not being shod. From this period until the Christian era, horses were represented on coins. It is clear that professional horse-trainers and horse-doctors existed three or four centuries before Christ.

Xenophon states that his book was not the first ever written on the horse, as there had been one written by Simon, who, Xenophon claims, was a fine horseman.

Xenophon's horse knowledge was remarkable, and much good would be gained by a careful study of his book to-day (translations can be procured second-hand).

His illustrations show clearly that bridles and bits were in common use, but give no signs of saddles, spurs or shoes. Xenophon was no advocate of cruel customs, although it would appear that fashions demanding the wanton mutilation of the horse had not been introduced in his day. The rider mounted on either side by springing up. Xenophon died 359 B.C.

The Romans possessed a number of good cavalry, but they did not profess to equal the Greeks in horsemanship. In 280 B.C. their cavalry, that met the Persians in battle, were beautifully horsed.

At this period the horrible practice of sacrificing horses to the gods was not uncommon.

The famous bronze horses of St. Mark's, Venice, probably adorned the triumphal arch of Nero, and later that of Trojan. These horses are hogged, with tails down to the hocks. They wear no harness, except a collar-band around the neck.

About 250 B.C., the famous Buddhist Emperor of India, Asoka, founded what was probably the first animal hospital in the world. He was a great humanitarian and gave vast sums of money towards bettering the treatment of horses. His hospital was free. Since that far-distant day the horse has been the victim of much abuse and wanton cruelty.

It is clear that the Greeks used spurs, which had no rowels but consisted of a single spike. Xenophon and Horace both tell us of the importance of the hoofs being sound and hard.

The Romans at the time of Cæsar did not use shoes on their horses, but covered the feet with a leather sock with a metal base. In the British Museum is a statue of Caligula (A.D. 37) sitting naturally on a horse bareback.

In 55 B.C., when Julius Cæsar invaded Britain for the first time, cavalry were becoming more common. Cæsar was met in battle by large numbers of mounted British. History tells us that at this period the English war-horse was extremely powerful. Many of these animals were taken back to Rome, where they were highly *prized. These horses were the result of crossing the English native* breeds with horses imported from Italy, Gaul and Spain.

Livy (*circa* 50 B.C.) speaks of the heavy Roman cavalry only using bridles. The light cavalry guided their horses with their knees.

Just prior to the Christian era, we read of white and of black horses in chariots, with long, curly manes and tails: the black horses were probably of Spanish or Gaulish blood. Cæsar, a few years B.C., and Tacitus—*circa* A.D. 50—both refer to the race of Iceni, who practised chariot racing and lived in the centre of England. The first riding race on record in England took place about 200 years after this.

Bridling is mentioned in The Epistle of James. "Behold, we put bits in the horses' mouths, that they may obey us; and we turn about their whole body."

In the first century A.D., Calpurnius and Columella mention the horse. In the third century, Oppian and Nemesian refer to it; and in the following century, Apsyrtus, Pelagonius and Palledicea give us information of much interest concerning it.

Towards the end of the fourth century, the Romans used saddles. The Romans returned to their own country from Britain, A.D. 410. Record is made that the Roman horses suffered sore backs from these chair-shaped saddles.

In A.D. 400, 200 Cappadocian horses were sent by the Roman Emperor as the most acceptable present he could offer a powerful Arabian prince, showing that horses were not too common in Arabia; as late as A.D. 700, thousands of camels and sheep were mentioned amongst the plunder in Arabia, but there was no reference to horses.

When Mahomet attacked Koreish near Mecca, he had but two horses. Previous to this we read of horses being sent as presents from Egypt to Arabia. It is, therefore, probable that many of the horses of Arabia and the south-eastern parts of Europe came from Egypt, but it is not certain whether they were bred in Egypt or brought there from the south-western part of Asia, or from the interior or the northern coasts of Africa.

The ancient sculptures on the ruins of Persepolis show that the horse was driven in chariots and used for pack work before he was ridden. Reliefs in museums show that for a long period horses were ridden without saddles and the riders rode with a bent knee and a seat similar to the modern hunting seat.

HISTORY OF THE HORSE

Berenger tells us that the first record of proper horse-shoeing dates about A.D. 460, at the time of Childeric. Within a century of this, horse-shoeing had become quite common. About then, the Swedes had become fine horsemen and possessed some good horses.

The Arabs, too, commenced to breed horses in a systematic way. About A.D. 610, Mahomet encouraged horse-breeding. Stirrups came into use about this period. In A.D. 630, the English began to use saddles; and soon after this saddle-horses became quite common.

About A.D. 700, a Chinese Emperor's tomb showed a miniature cart-horse, about 15.2 hands, with plaited mane and tail, a kind of stock saddle and large saddle-cloth, bent metal stirrups, rope stirrup-leathers, rope bridle and ring metal bit. Another design showed a horse in motion, walking correctly and very true to life.

Horse-racing was popular in France in the ninth century.

It is interesting to note that in those days frauds were only too common amongst horse-dealers and breeders, and many instances were recorded of brutality practised on horses. Little attention was paid in those days to the sufferings of dumb animals.

About the time of Alfred the Great (871–901), the English breeds were crossed with imported German running horses.

To come to the period of the Norman Conquest (1066). The general development of the horse was now encouraged in many countries. A number of fine stallions were imported into England from Spain. William I did much good to our breeds by bringing with him Norman cavalry horses of the best type.

Subsequently Crusaders brought many useful horses from Eastern countries.

In later history we find that King John (1199–1216) imported a hundred stallions of fine breed from Flanders. These were agricultural horses.

Horse-breeding was again given encouragement when Henry III (1216–1272) came to the throne, and this king was very fond of horses: he studied their proper breeding. Edward II (1307–1327) imported war-horses from Lombardy.

Edward III (1327–1377) encouraged horse-breeding. At this period much interest was being taken in the turf and also in the chase. The king purchased a great number of foreign horses and brought them to England.

Nevertheless, at the battle of Crécy (1346) there was a great shortage of horses for the English troops. Edward imported many fine Spanish horses. He was devoted to turf sports and probably kept race-horses of his own.

Richard II (1377–1399) was a horseman and encouraged horse-breeding. One of his horses, in particular, he is said to have loved like a son; this was Roan Barbary, to which Shakespeare refers in *Richard II.* Horse-racing proper is supposed to have begun in his reign. He did much to improve the English breed.

Henry VII (1485–1509) and Henry VIII (1509–1547) did much to improve the breed of the English horse. Cardinal Wolsey, in the reigns of the two Henrys, who was a fine horseman and horse-master, did much to encourage horse-breeding and horsemanship. When Henry VIII entered on his long reign a great impulse was given to horse-breeding. He was a keen sportsman and spent his money freely upon the bettering of horses. He owned many famous barbs and other race-horses and was also a lover of the chase.

Queen Elizabeth (1558–1603) was a lover of the turf and a lover of horses; she was a good horsewoman and rode considerably. A great advance was made in turf-racing, and consequently in breeding race-horse stock. Many new races were run.

In 1565 the first coach was built in England for the Earl of Rutland.

The first race held in England was in 1511, on the Roodeye, at Chester, for a silver bell worth 111 shillings. This took the place of foot-racing and archery. The horses stood 13.2 hands. The distances were long and the stamina was good.

The first bell-race at Carlisle was run in 1559; at Paisley in 1620. At Leesome, in Cheshire, in 1683, James, Duke of Monmouth, rode a winner.

James I (1603–1625), who is supposed to have founded Newmarket, encouraged horse-racing and breeding.

At the close of his reign, horse-racing had become so generally popular that it was denounced by public speakers and clergymen as being the beginning of the ruination of the country. Many of the fast turf-horses bred at Newmarket were bred from some of the Spanish Armada horses. About 1640, horsemanship in England was greatly benefited by the Duke of Newcastle, who was a high authority on riding, schooling and care of the horse. He published his famous book on horsemanship in French in 1658. This was regarded as a standard work all over Europe. School riding thus became a popular pastime. The duke himself was a fearless and a finished rider; he rode with the high-school seat and a straight leg.

At the close of James the First's reign, horse-races were run under definite rules.

Charles I (1625–1649) was an ardent lover of turf sports.

Charles II (1660–1685) followed no less keenly. He was an exceptionally good horseman and, it is said, was most humane in his treatment of his horses. During the time of these two kings, horses increased in value.

Throughout the eleven years of the Commonwealth under Oliver and Richard Cromwell (1649–1660), the turf and the chase suffered a severe setback; for, although Oliver Cromwell, great cavalry leader as he was, encouraged the breeding of the magnificent chargers ridden in those days, he forbade the continuance of either horse-racing or hunting. Fortunately these were resumed, with renewed vigour, on the accession of Charles II.

In 1669, the first systematic attempt was made to run a coach between Oxford and London. Stage-coaches now became quite common and this naturally provided a new incentive to horse-breeding, that of the heavy coach-horse. The early coaches were extremely heavy, and the roads very bad.

While writing, I have before me some of Van Dyck's and Landseer's paintings of the horses of the early Stuart period. When one compares these superb specimens of nature's handiwork with some of our so-called ornaments of the modern show-ring, one rightly asks if civilization has not sadly declined.

In 1712, a weekly coach service was inaugurated between London and Edinburgh. The trip took 13 days and the cost was £4 10s.

About this period the horse had a serious rival, but it survived it as it has done all rivals since. The self-propelled vehicle made its appearance. In 1641, a man named Soloman was locked up for suggesting the use of steam. The Marquis of Worcester also invented a steam engine. In 1769, James Watt invented and made the first practical steam engine. In 1804, a locomotive on rails ran at five miles per hour at Merthyr Tydfil. In 1814, George Stephenson began his great work on the Killingworth Railway.

It was soon found, however, that with the introduction of the railway, the horse was required more than ever.

It was during the reign of Charles II that the first of the three ancestors of the present thoroughbred horse was imported into England; this was the Byerly Turk, born about 1680. In his line we find Diomed, Buzzard, Sir Peter, Castrel, Bay Middleton, The Flying Dutchman, Thormanby, Gladiator, Buccaneer, Hannibal, Saphir and Herod.

Then came the Darley Arabian (born 1702). His line includes Flying Childers (1715), Eclipse (1764), Hambletonian, Whalebone, Whisker, Touchstone, Birdcatcher, Tramp, Newminster, Orlando, Hermit, Lord Clifden, Stockwell, Isonomy, Isinglass, Oxford, Blair Athol, Doncaster and Bend Or. (*See* Plate facing p. 14.)

Then came the Godolphin Arabian (born 1724). His line includes Matchem, Melbourne, West Australian and Barcaldine.

It has been rightly said that the English Thoroughbred of to-day owes its greatness to the three chief lines: the Eclipse line, the Herod line and the Matchem line.

Eclipse did not run until he was a 5-year-old, and only ran for two seasons (1769 and 1770). His first race was at Epsom, on May 3. It was for £50, in four-mile heats; he carried 112 lbs. He was never beaten and won 16 races. He was never punished with whip or spur, and won £25,000.

In 1760, the Duke of Northumberland sent to Arabia to procure "blood" horses; the word Thoroughbred had not then been introduced. The early volumes of Weatherby's "General Stud Book" made no mention of the word; the description, "Race-Horse" is used.

In 1832, the term "half-bred" is used. In 1849 (Vol. VI), there is the first mention of "thorough-bred," spelt with a small t and with a hyphen. The term blood-horse or bred-horse referred to Eastern horses.

George III (1760–1820) was a keen horseman and encouraged driving and other equine sports. It was this king who so openly condemned the cropping of ears and the docking of tails, as "unbecoming the ignorance and cruelty of savages." The king forbade all horses in his army from being so disfigured and several steps were taken to pass laws to abolish such cruelty. Thank God, the cropping of ears, at any rate, has been extinct for many decades.

From this time on it was so generally realized that the horse-breeding industry was so important to the country that the sovereigns, and all those in authority, did all they could to help and encourage sport in connexion with horses. It was fully established that horse-racing and successful horse-breeding were intimately connected.

THE THOROUGHBRED

The Thoroughbred was brought to perfection in England before other nations realized his value. The climate of the British Isles and the abundant limestone localities made the country the very best for breeding the Thoroughbred. Hence, in two centuries, we see him increase in size about one hand. Our horsemanship is equalled by no other nation, and this has a great bearing on the success of this breed. All other nations have continually to re-introduce British stock into their studs. To produce the best, we must determine which are our best, and this can only be done on the race-course.

Take Hampden, for example: an ordinary selling-plater and hurdle-racer. He developed into a cup horse, siring three Derby winners and giving us the line to which Gainsborough and Gay Crusader belong.

The five English classics for three-year-olds date back as follow:—The Doncaster St. Leger 1776, The Epsom Oaks 1779, the Epsom Derby 1780, the Two Thousand Guineas (Newmarket) 1809, and the One Thousand Guineas 1814. The Oaks and Thousand Guineas are open to fillies only.

The Grand National Steeplechase, at Liverpool, was first run in 1839; time, 14 min. 53 sec. The distance is about four and a half miles. The time now is about 9½ minutes. The record is 9 min. 34⅖ sec., in 1906, by Ascetic's Silver.

The course is over plough, stubble and grass. There are sixteen very stiff jumps, mostly nearly 5 feet high and 3 to 5 feet wide. Many have a 4- to 5-foot ditch as well, and the water requires a 20-foot leap to clear it.

West Australian was the first Triple Crowner, winning the Two Thousand Guineas, Derby and St. Leger in 1850. Other Triple Crowners are Gladiateur, Lord Lyon, Ormonde, Common, Isinglass, Galtee More, Flying Fox, Diamond Jubilee, Rock Sand, Pommern, Gainsborough, and Barham.

The tail-male line of Myram is interesting: Myram—Flying Fox (Derby)—Orme—Ormond (Derby)—Bend Or (Derby)—Doncaster (Derby)—Stockwell.

St. Simon was one of the greatest sires ever bred. His children include: Persimmon, Diamond Jubilee, St. Frusquin, Signorina, La Flêche, Florizel II, Memoir, St. Serf, William II and Raeburn. And his grandchildren include: Sceptre, Ard Patrick, Prince Palatine, White Knight, Willonyx, Zinfaudel, Flair, St. Amant, Craganour and Stedfast.

Some Race Records.—Crucifix was purchased for 54 guineas and only raced twelve times. She won nine races as a two-year-old, and as a three-year-old she won the Two Thousand and One Thousand Guineas and The Oaks.

Caiman ran one mile at Lingfield in 1900 in 1 min. 33⅕ sec. *The record for trotting (without wind shield) was made by Direction I, in 1 min. 56¾* sec. Great Surprise, carrying *143 lb.* at *Epsom, in April 1912, covered five furlongs in 55¾* secs.

Master Willis, at Epsom, in 1901, covered six furlongs in 1 min. 7⅕ sec.

The record for the human mile was made by Norman S. Taylor, an Oxford Rhodes Scholar, in 4 min. 12⅗ sec.

Some gigantic sums have been won by horses. In 1844, Lord George Bentinck won £100,000 at Chester, when Red Deer won the Chester Cup.

The first Earl Grosvenor had 500 horses in training during his turf career. The Grosvenor family have won seven Derbys, nine Oaks, five Two Thousand Guineas and six St. Legers. The late Duke of Westminster won 344 races and £301,614. His horses included Doncaster, Bend Or, Ormonde, Orme and Flying Fox.

The Bend Or Line.—For a long while the St. Simon line remained at the top of the list of successful race-horses, but now the Bend Or male line has risen to the top, and fairly and squarely outstridden the St. Simon line. Bend Or was bred in 1877, by the Duke of Westminster, and was the eighth produce of Rouge Rose. He was a chestnut, standing 16.1 hands, with a blaze; had a girth of 74 inches and measured 8½ in. below the knee. He was amongst the first, and was the best, of Doncaster's sons. He had most beautiful conformation—shoulders, chest, back, head, quarters, hocks, knees and feet.

BRIEF OUTLINE OF THE WORLD'S HORSES

It seems almost certain that the horse was a native of the forest and not of the plains.

American horses are mostly from the English and French.

The small eastern Canadian horse came from the French. Some of the American trotters have this blood in them. The trotter is of the standardbred breed and owes part of its origin to the imported English Hackney Bellfounder (1822) and the Thoroughbred Messenger, imported about the same date. These two sires were the progenitors of the American Trotter. (Plate facing p. 218.)

The Conestoga breed, from Pennsylvania, is a long-legged, light-bodied horse, used chiefly for light carriage work. The Virginian and Kentucky breeds originated from the English Thoroughbred. The Percheron owes its origin to the Belgian and French draught horses, and is a very popular draught breed on the North American Continent. English and Scottish breeds are very numerous; the Shire, Clydesdale and Suffolk Punch being the commonest heavy draught; the Hunter, Hackney and Cleveland Bay, the commonest light horses; the Welsh, Galloway, Dartmoor, New Forest, Exmoor, Highland and Shetland, the commonest of the cobs and ponies.

Troops of wild horses were found on the great plains of Tartary and in South America. These may have been feral horses, that is, not of wild origin, but from escaped domestic horses. Some of the Tartary horses were descended from those turned loose at the siege of Azoph (1657) for want of forage.

The manner in which these wild horses protect themselves is interesting. They move about in troops of as many as 10,000, the mares and foals in the centre. There is one leader; the remainder implicitly obey and trust him. He is the first to face danger in case of attack.

Travellers have found it dangerous to approach these troops on horseback, because some of the wild horses would try to entice the intruder to join them. Very often the saddle-horse would rid itself of its rider and, with a wild yell, join the troop. In other cases, the wild horses would attack, and endeavour to kill, domesticated horses. These Tartary horses, when captured, were found to be very docile, if properly handled from the first. Matured horses were rarely captured. Western Mongolia was the chief habitat of these Tartary, or Tarpan, horses.

At the beginning of the nineteenth century, troops of wild horses were found in the central parts of Africa, in the Island of San Domingo, in the deserts of Arabia and other places; but they did not equal domesticated horses in form, strength or speed. In 1550, in Argentina, real wild horses (that is, not feral horses from European blood) were found. There seems little doubt that Africa was the first continent to produce the modern horse. The origin of all African horses is the Barb, from Barbary, Morocco, *Fez and Tripoli,* remarkable for its fine and graceful action; its *height seldom exceeds 14.2* hands. Many of the best race-horses trace their descent from African Barb mares. The Arab has better spirit, speed and countenance than the Barb.

The kingdom of Dongola, and the neighbouring districts between Egypt and Abyssinia, produced the Dongola breed, a much larger horse, 16 hands in height, with a shorter body than the Arab. Some were imported to Europe early in the nineteenth century, but did not count for much.

Going farther east, we come to the home of the Arabian. *Only 75 years ago there were many wild troops in Arabia. These horses* were extremely swift; some were hunted by the Bedouins for food. In the seventh century, Arabia had very few horses of any value; but such great care was taken of the Cappadocian and other breeds, that in 600 years (thirteenth century) they had produced one of the finest breeds in the world—the Arabian.

The Arab was divided into three breeds: the Attachi, an inferior breed; the Kadischi, a half-breed; and the Kochlani, whose genealogy in some cases could be traced back for 2,000 years. The owners kept the pedigrees of these wonderful steeds with greater care than they kept their own family history. The Bedouin Arabs had been chiefly responsible for the breeding of the Kochlani Arab horse. It has only been with great difficulty that an Arab mare has been purchased; but imported Arab stallions were quite common. The mare was considered the better animal, and genealogies were kept on the female line.

The finest part of the Arab horse is the head; his carriage and proudness are superb, and this is greatly enhanced by the high carriage of a beautiful and high set on tail. The broad, square forehead, short, fine muzzle, small ears and prominent, bright eyes are typically characteristic. His shoulders are ideal, but his chest may be a little narrow; he has plenty of lung room, however. He seldom exceeds 14.2 hands. His legs are small, but strong, and he is capable of great endurance. Great courage and even temper are his characteristics. Bishop Heber, in his "Journeys Through Upper India," states: "He is not the fiery, dashing animal I had supposed, but has as much attachment and coaxing ways as a dog." This is due to the early upbringing

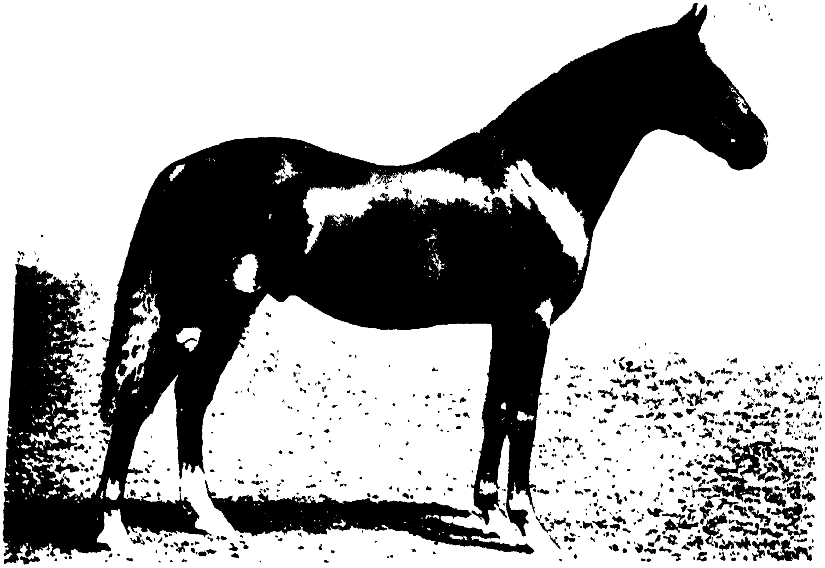


Photo: W. A. Rouch

THOROUGHBRED: BEND OR

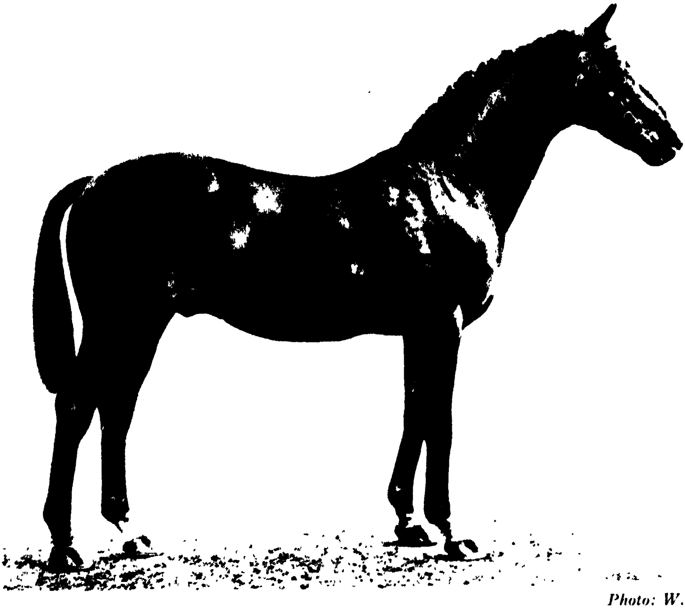


Photo: W. A. Rouch

THOROUGHBRED: WEYLAND

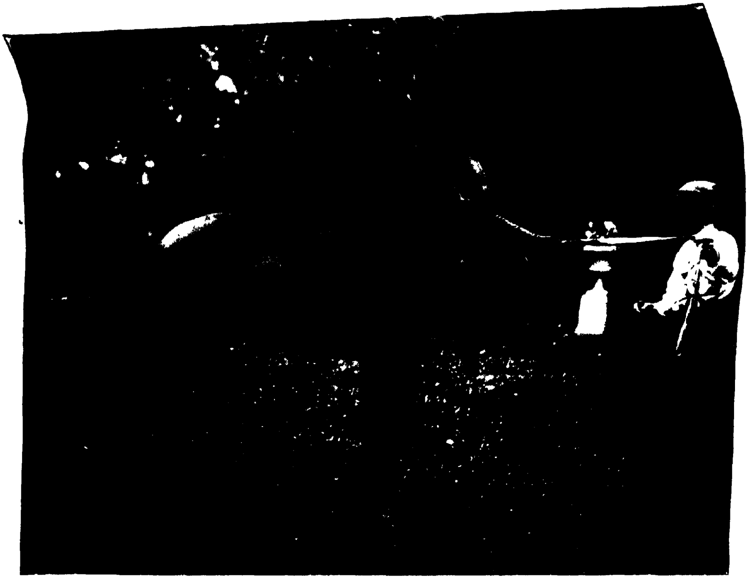


Photo Tucker

ARABIAN STALLION

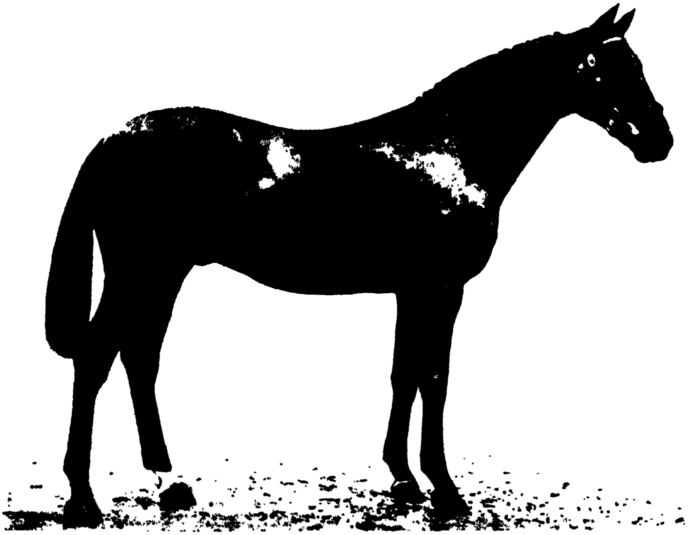


Photo: W. A. Rouch

THOROUGHBRED : RENOWN

of these horses; so different from the harsh methods we see so commonly.

Still farther east we come to India. There are several Indian breeds; the most important being the Toorky, from Persia; a beautiful and docile animal, with good spirit and action. Other breeds are the Iranee, the patient and strong Cozahee, the speedy and beautiful Mojinniss, and the Tazsee, a not beautiful breed, but very comfortable to ride.

We now come to the Chinese horse, the Mongolian pony. This animal varies greatly. He is small, shaggy and ugly; but some have great endurance, and as a breed they are hardy.

Returning westward we come to the Persian, which is in many ways like the Arabian, but with less endurance. He is an older breed than the Arab. Alexander the Great was a fervent admirer of the Persian horse.

The Turkoman breed that comes from South Tartary (N.E. of the Caspian Sea) constitutes a pure and valuable breed. They excel the Persian for utility; are much larger—up to 16 hands—swift and of great staying power. The head is too large, legs long, and barrel inclined to be small. The horses from other parts of Tartary (the plains of Central Asia and European Russia) are small and badly made, but can cover long journeys at a rapid pace on comparatively little food. The Turkish horses come chiefly from the Arab.

The Italian horse has degenerated in the past few centuries. The old Neapolitan breed was a particularly suitable carriage type of size and stateliness.

Spain has always bred some good horses, which owe their excellence to the Barbary blood brought over by the Moors. Spanish horses are small. Most of the draught work in Spain is done by mules or oxen.

The German horse is large, heavy and slow. Many modern German horses originate from Holstein.

There are many French breeds. The best are from Limousin and Normandy. The modern French horse is much crossed with English breeds.

Flemish and Dutch horses form a great part of the ancestors of our draught horses; their breeds are strong, large and well formed.

Swedish and Norwegian horses are small, speedy, high-spirited and well-formed. Finland breeds are small. The Iceland pony *is small, strong and fairly swift,* and is probably a descendant of the Norwegian.

It is regrettable that the climate of the North American Continent is not suited to produce fine horses for generations without deterioration. Before European *horses were imported,* the *horses* of the United States and Canada were *small* and of *little* value, although these originated from large and well-formed stock. European blood has to be admixed every so many generations. England, on the other hand, has the ideal climate, soil and water for horse-breeding, the breed improving from generation to generation. Take for example the various breeds of cobs.

CHAPTER II

PSYCHOLOGY OF THE HORSE

LET us first consider what the equine machine is. It is a complicated mass of powerful and less powerful muscles that connect to bony levers (limbs, etc.), and have the power of moving these levers, which in turn are connected to a powerful framework of bone. These muscles must receive vitality, or else the cells of which they are composed will die. This vitality is supplied by various organs; these are placed within and protected by the framework, which also forms an origin for most of the muscles.

The framework (carcass), then, has a twofold function. All the cells in the bones, as well as those in the muscles, have to be supplied with vitality (food), as have also all the tendons, ligaments and other tissues. This cell food is part of the blood, and is carried by the blood to all cells of the body. The blood receives its food by means of various organs, which abstract certain chemicals from animal, vegetable and mineral compounds, that constitute what we call food.

These organs receive this food, grind it up, convert it into other chemical compounds and pass it into the blood and lymph streams, which flow in the arteries and lymph vessels. Solids not required are passed out. Liquids not required are collected by the kidneys (the blood filters) and passed out. Some of the solids and liquids required are collected from the blood and stored by the liver; the remainder is distributed by the blood.

Another necessary food is oxygen. This is collected by the lungs from the air and carried by the blood to the cells of the body.

The whole of this machine has to be regulated. This is done by a marvellous telegraphic system, the nervous system, partly involuntary and partly voluntary in action. The involuntary part regulates the vital mechanism. These telegraphic circuits are connected to sub-offices, the spinal cord. These sub-offices are again controlled by a central office, the brain.

Besides the mechanical movements, this machine is given senses that are controlled by the brain. The central office is enclosed in a bony case. The whole frame and the levers are protected by a fatty cushion and connective tissue, and outside, by a hair-covered, thick skin.

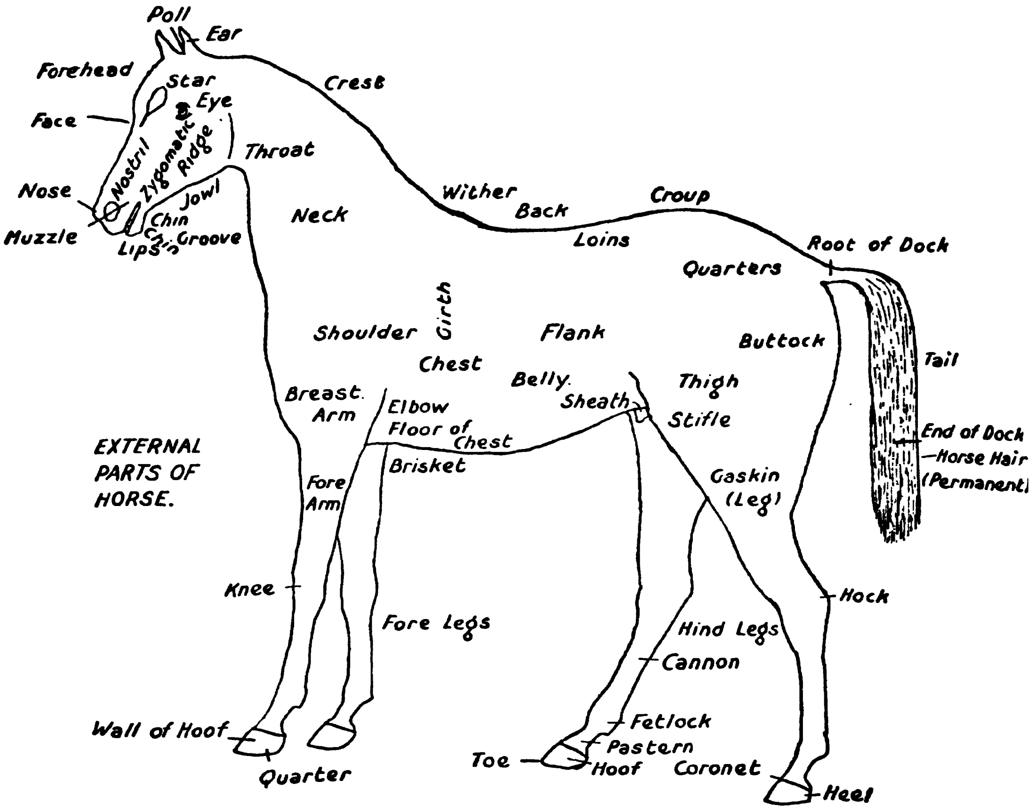
So we must realize that the horse is a living machine, controlled by a brain—a mind; and we must always bear in our own mind, that the horse's mind (like our own) must be, if any success is to be attained, developed before it will be able properly to command the machine which nature has placed under its control.

The Horse's Mind.—If we are to train the horse to any state of perfection we must develop and train his mind. Horses are very similar to children and vary in intelligence and quickness in learning just as much. Let us, therefore, consider the psychology of the horse in detail.

Anatomically, the horse's brain is much smaller proportionately than man's, but his spinal cord is much larger. This is made quite clear when we see the effect an overdose of alcohol has on the horse: it affects the organs of locomotion (controlled by the nerve centres of the spinal cord), and has less effect on the brain that is not so highly developed. This varies, of course, according to the intelligence of the horse in question.

Senses.—The horse is born, as we are, ignorant, and has therefore to be educated; but he possesses very marked powers of instinct. (In wild horses—either of wild descent or feral horses—the natural instincts are very highly developed.) He possesses similar senses to those of man; hearing, smelling, tasting, seeing and feeling. Those of smelling and tasting are very well developed, and so also is that of hearing. Unfortunately, the sense of seeing is often impaired through bad management by dark stables. It is absolutely essential that a horse should be stabled in a well-lighted building, otherwise the eyesight will suffer. I have seen it stated on more than one occasion that a horse cannot see very far. This is quite wrong. I have carried out numerous experiments and have proved that normally a horse has long sight; often far better than human beings.

The sense of feeling is well marked, but this varies with the temperament and nervous development of the horse. Horses vary greatly in the manner in which they show pain, just as do human beings. Generally, the skin of the horse has not the same number of nerve endings per unit area as has man's. Some horses will bear unflinchingly a great amount of excruciating pain. Fear



EXTERNAL PARTS OF THE HORSE

is often responsible for absence of motion or reaction, but the horse's eye tells us if he is suffering.

The sense of hearing is very acute, so much so in some horses that shouting or other loud noises are responsible for strange actions; these are usually put down to the horse's stupidity by those who possess little horse-sense. Firing of guns has a very disturbing effect on some horses, due to a highly sensitive ear. One horse I rode in France was gun-shy, but this was made very much worse after she had been wounded by shrapnel that burst close to her; and afterwards she showed great fear at any loud noises. A remedy for gun-shy horses is to put cotton-wool in the ears.

The sense of smell is very acute. This was the horse's chief means of choosing food and receiving warning of an approaching enemy in bygone days. In the little geologic Hipparion this sense was very highly developed. He had large suborbital glands which secreted a strong smelling fluid that was smelt for a great distance. It is often erroneously thought that the horse smells everything he puts his muzzle to: in many cases, however, he is really feeling the object with the tactile hairs, or feelers, on the end of his muzzle. Of course, his sense of smell tells him a great deal about the object that he is investigating.

The upper lip is very well developed; he uses this in his feeding operations. Play with a horse and see how cleverly he uses his upper lip to work your fingers into his mouth. The tapir has a snout similar to that possessed by the small ancestors of the horse.

Intelligence.—The mind of the horse varies very considerably in quality. While I fully realize that the poorer-bred, badly-brought-up horse possesses little intelligence, I refer, in this chapter, in considering his character, to the better-bred and better-educated animal.

Contrary to the opinions of many authorities, the horse has intelligence. Those writers, such as Fillis, who allow no credit to the horse for intelligence, give reasons that are far from convincing, and do not appear to have the inner sympathy for the horse, without which his intelligence cannot be appreciated. It is true the horse has not much reasoning power—perhaps this is to his advantage. But he does many things to show that he has some, and often quite a lot.

It is his intelligence that makes him oppose certain acts demanded of him; that he awaits his opportunity to attack a person who has ill used him; that he respects *the trainer who is* kind to him; that he hurries home when *his meal hour is close*; that he throws his rider who is ill using him or riding him badly; that he goes around a jump to avoid a jab in the mouth from a bad rider; that he hesitates to take a jump when his rider also *hesitates through nervousness; that he opens his stable door* and makes his way to the oat bin.

We had a very *intelligent* horse *that* I used as the star performer in our Regimental Circus for years. In a disastrous fire in one of the stables, this horse slipped his head-collar and walked out of the stable and, from a short distance, watched the whole proceedings while the firemen were at work, and after the fire was put out walked back to his stall.

The *intelligence of the horse increases rapidly with his education.* An intelligent master or *trainer* can make an *intelligent* horse. It is a stupid trainer that makes the so-called stupid horse. A horse develops in a marked way the characteristics and intelligence of his trainer or master.

If a horse who balks is tied for several hours at the spot where he balked, the next time he is taken there he will go past it, because he anticipates the same consequences. Similarly, any balky horse that has had any experience with fire, will move forward immediately a small handful of lighted straw is held under him.

I was lost in a blizzard in the North-West many years ago and owe my rescue entirely to the intelligence of my horse, who happened to have been bred at a ranch close to where we were lost.

A mare at Glendale, Manitoba, used to go to the pump and fill the trough with ease, using her lips to work the handle of the pump: when the valve of the pump "caught," she would use her teeth to get the extra purchase. As fast as she pumped, the cattle would come and drink the water. After they had all finished she would fill the trough and have her drink and go off. When one day a visitor arrived at the scene, she stopped pumping, pawed the ground, and looked round as if to say: "Please do this for me."

I had at one time in my squadron several examples of unusual intelligence. One horse, when he went to the water-trough, always turned on the cold tap, as he found the water that had been standing in the trough too warm for him. By the side of the cold tap was a hot tap that was used in very cold weather to take the chill off the water: he knew which tap he wanted. On one occasion, I saw him turn the hot tap on; he felt the water and immediately turned the other on full and drank from underneath it. We turned the cold tap off several times and watched him turn it on again until he had had his fill. The tap was the ordinary brass T-tap and the horse used his teeth.

We have another horse that will neigh when told to, just like a dog will often "speak" when told to. I have a mare that will always kiss me when I tell her to do so. She knows exactly when I use the correct sentence.

A latent characteristic in the horse is his power of getting over any sort of rocky mountains or swamps to obtain water and food. He derives this instinct from his ancestors.

It is extraordinary how horses know the men who handle them, and they also size up strangers in a manner equally extraordinary. How is it that some people are always getting kicked by horses, whilst others, who apparently take no precautions in particular, never get kicked? It must be the influence some people have upon horses. These same people can handle any horse and change a bad horse into a good one in a very short time. A horse, when in fear, often, apparently, loses much of his intelligence.

Love for Man.—One could fill a chapter in stating facts to show the love the horse possesses for man—but not all men! I have experimented with numerous horses and purposely never fed them, and find the love of a horse for his master can be intense. I remember a two-year-old, whom I never fed, being very fond of me. I was away for some months, and upon my return I entered the stable quietly and went up to him, with nothing to offer him; when he saw me, he made a great fuss, and whinnied. In the late war, we know of the case of a cavalryman who was killed and his horse remained for two days by the body in the thick of shell and bullet. Sergeant Parker, of the R.N.W.M.P., owed his life to his horse. They got in a blizzard and Parker became snow-blind. His horse went several miles and found some farmers on the trail; he called to the horses and attracted the men, who noticed the empty saddle and followed the horse back to where the sergeant lay in an unconscious condition.

To the sagacity of his horse a homesteader of lower Klamath county owed his life. Injured by a fall, he managed to crawl to his cabin, where he had food, but no water. He wrote a note, which he attached to a string around the neck of his horse.

Two days later lumberjacks saw the horse following them and observed the note. The horse led them to the lonely homestead, where the man was given aid.

We read of many cases where a rider has been injured and the horse has refused to leave him. In one case the drunken master had fallen off his horse, and the latter stood all night watching him, without food or water. Instances are common of horses behaving in a marvellous manner when their masters have been in peril. And how soon the young horse realizes he is not going to be hurt when first handled by a modern and intelligent trainer! A so-called wild horse will generally give in in five minutes after being caught. Many horse-breakers (which is a good name) have no sympathy and no equine knowledge, and, therefore, can never educate a horse.

I remember one horse that showed its affection very strongly. For some weeks he was turned out in the pasture field, and on several occasions while I was walking and talking near by, the horse would recognize my voice and come up and put his head over the fence. I had never fed the horse in the field.

I had a Thoroughbred, that had been in my possession for sixteen years, in a railway collision. She was partially buried under a wrecked car and was struggling for freedom. When I got to her and spoke, she whinnied and lay quite still until we rescued her, with only slight injuries.

Special Characteristics.—A great many of the horse's actions are caused by his instincts of fear and self-preservation and of his own needs. He has a most extraordinary imagination and magnifies things, and this causes his susceptibility to fear. *This helps us, though, in training him.*

He is extremely observant of minute details, and things which would make little impression on our minds will make a great impression on his; it is often difficult to discover what originally caused him fear.

He is peculiarly susceptible to intense excitability to motion on the slightest provocation. It is the chief reason of his being the valuable animal that he is; it is the basis on which his training is founded.

Some horses are very fastidious, others very suspicious. I knew of a horse that would not eat its feed, if it had been placed in the manger by a stranger, until his master had assured him that it was all right. Although a horse will show signs of pleasure at the approach of the groom who feeds him, he will give a little whinny when he sees his master of whom he is really fond. True affection between man and horse, unfortunately, is not common.

The character of the horse depends, as in human beings, as much on the parents as on the influence of the trainer. One can quite easily judge the type of man that has trained many horses. The horse acquires the kind, or cruel, ways of his master; his brightness or his stupidity; and his temper.

The horse usually pays attention to one thing at a time and, therefore, much can be done if the trainer keeps his eye on the horse's eye and prevents the animal from concentrating upon, or even noting, other objects. It has been said that a horse takes no notice of our facial expressions, but only watches our hand and leg movements. I have experimented and proved this is not so. He does watch our facial expressions very often. I remember a Thoroughbred that understood by my face whether I was angry or pleased, and by smiling I could make a distinct impression, when there was no connexion of any sort through the reins. The horse does not understand our looks to the same extent as does an intelligent dog. An angry horse is calmed by our gaze. Some horses act strangely on certain days, but this is generally due to brain affection, and is very rare.

A horse seeks his own pleasure; he looks for what will cause him pleasure; he, therefore, likes things that are associated with pleasure. Unlike man, he is not always looking for work. He is content to spend the greater part of his life standing in a stable looking at a bare wall, unless he is fortunate enough to be owned by one who provides him with a loose-box, the door of which opens to the outside world. The horse seeks pleasure instinctively.

Almost all horses are good sportsmen. A horse is generally very clever in avoiding injury to a man, especially in a fall.

Horses have generally a crude sense of humour. To lift a hat off one's head and drop it into the horse-trough is quite a favourite trick.

Horses often have a great sense of pride. One that had served ten years in the Washington Fire Department was sold and rewarded with a job hauling a garbage cart. This broke the old horse's heart. A few days after he was sold, he bolted with his new cart and deliberately committed suicide by running headlong into the brick wall of his old fire hall stable.

The horse is generally sociable and this trait can be turned to good account, for he will follow another horse into the water, into a horse-car or motor-truck, and approach objects that he generally dislikes. In some cases, the affection for man being great, the presence of a man to give the lead or stand on the side towards the object, will have the desired effect.

Some horses hate other horses, and try to kick or bite them whenever they get an opportunity.

Others are very conceited and like to attract attention. It is a well-known fact that some show-jumpers will never make a good performance unless before a large crowd.

A horse neighs to attract attention; he likes being noticed and being made much of. He shows envy if another is fed or fussed over and he is neglected. This may cause him to feel hatred towards other horses. Jealousy in an entire horse is generally more marked. Brood mares are often very jealous.

Other horses are obstinate, but this is generally due to wrong handling. A horse may have a predisposition to obstinacy, and must, therefore, be handled accordingly. Obstinacy may be due to excessive exuberance of spirits. It is not common amongst well-bred horses.

Courage is generally a valuable characteristic. A horse may have lost his courage through bad training. Cases are known where horses have fought wild beasts, such as lions and tigers, in self-defence. Courage in a horse, as in man, fluctuates to some extent; but as a rule the horse is not nearly so moody or temperamental as man. Lack of courage in horses, as hunters, is very often due to the animals being temporarily in ill-health, or else to their being improperly fed, or in soft condition. Outside of jumping, the show-ring cannot possibly test a horse's courage.

"Handsome is as handsome does," said Jorrocks, and the horse must have a good heart if we expect him to have courage.

There is no reason why the entire horse should not be as docile as the mare or gelding, provided he is brought up in suitable surroundings. The Arabian entire, which is brought up as one of the family, is perfectly docile and usually constitutes the Arab's saddle-horse.

The horse has a disposition to copy what he sees. He wants to gallop when he sees other horses gallop. He rolls when he sees others rolling. This trait is of great use in training.

The horse becomes irritated, and perhaps angry, if we do not please him; so we must always try to please him whilst keeping him obedient to our wishes.

The temperament of horses varies a great deal and, therefore, the care and handling that they should get in the stable or at work must vary in detail. But the principle is the same with a horse of any kind of temperament—absolute gentleness and quietness, absence of harshness, abuse, bullying, bad temper or haste on the part of the attendant or trainer.

The horse's character varies so much that, although a great deal can be learnt from external examination, we need to ride or drive him before we can get a thorough insight into his character.

He may be good, bold, subject to fear, or bad. The various *factors that constitute his character might be summed up thus: the degree of sensibility, as of fear or obstinacy; willingness to surrender to man; the sensation of touch, as tickling by the spurs;* the quality of his will; the sensitiveness of his mouth to the rein, and his flank to the leg; and the degree of excitability to motion.

Power of Communication.—There is no question but that the equine language and power of communication is stronger than in any other domestic animal. It is far stronger than in the dog.

In the cavalry one has many opportunities of studying the behaviour of stable mates towards one another, when temporarily separated, by being moved into another position in the stable or to another stable.

Whinnies and neighs are as varied as the human tones, and horses alone understand them all. To us, though, there is a distinct difference between the whinny of a mare for her foal (it is insistent and of short, successive notes) and that of a gelding or filly calling for a stable mate (it is more spasmodic and penetrating). A stallion or mare will call for its stable companion when at full gallop.

When one horse is taken away from its stable mate, the latter calls; but on returning, the other one calls and is answered by the mate that was left, although the stable may be full of horses.

Then the call of the troop horses on "feed" being sounded is low and throaty, and only becomes impatient if there is unusual delay. The neigh or shriek of terror is seldom heard. It is sometimes heard in battle; but the worst incident I can recall was when a dozen horses were cut to pieces in a railway wreck.

A horse groans when in pain. Horses often squeal from fright when being thrown for an operation—which, by the way, is a barbarous and out-of-date method of surgery.

In France, horses also squealed when bombed by aeroplanes, especially those which had been previously bombed. Yet those horses that were terribly mutilated would patiently and silently wait for the humane end. Then there is the cry of anger: a short sharp cry, or a snort, made when a horse attacks a person with open mouth—a rare occasion. To the student of psychology, and the observant trainer, a horse can speak, and often very clearly.

Homing Instincts.—A great number of cases of horses finding their way back to their old home, or of returning home alone, are on record. Their homing instinct is almost uncanny. A horse can be taken for miles over new country and find its way back without difficulty. I have on many occasions been lost at cross-roads and left the choice of the turn to my horse.

A cavalry horse sold at Canterbury, and moved to Barham, was found a few days afterwards, without halter, back in his own stall at his old barracks at Shorncliffe. This speaks well for the care of horses in the Army.

A writer recently in the *Cavalry Journal*, relates how he lost his way in an African jungle, and got back to his last bivouac, fifteen miles away, by giving his horse a free rein.

The old 'chaser, Ravenscliffe, which ran in the Grand National, was pensioned off and sent sixteen miles away to pasture by a road that was new to him. He evidently missed his master, for he broke out of the field and made his way back to his old home, over a few railway gates and a toll-bridge and landed up at his master's windows, whinnying loudly. There was a story told at Newmarket lately of a blind mare finding her way back over unknown country to her old home a number of miles away.

Some decades ago the owner of two draught horses at Erie, Ontario, sold the pair to a man in Buffalo, across the mouth of the Niagara River. Next morning these horses were found back again in their old stable. The original owner took them back, but promised to repurchase them if they ever did it again. A week later they got loose again, swam back to Erie and there they remained.

However far a horse may be taken through a strange city, he will know, save in exceptional cases, when he turns his head towards home. If one goes over miles of strange prairie land, making turn after turn, and the horse is then let loose, he will find his way home by the nearest route. This is due to a natural homing instinct, which, at times, has almost bewildered me, and to his sense of direction and memory.

The faculty in a horse of being able to realize on which side he is engaged is another example of the horse's powers that are so useful in his training. Intelligence must play a large part in this. History records various instances where a horse has refused to allow an enemy to mount him in battle, and where horses have returned riderless to their own lines, after riding through those of the enemy. A Scotsman, named MacDonald, having killed an English officer in battle (1745), took possession of his horse. The horse, in spite of the efforts of his new rider, galloped back to the English lines and reached the head of his own regiment, the place in which he had been accustomed to move. MacDonald was taken prisoner.

The Use of the Voice.—The voice is a most valuable aid in training horses. Further mention is made of this in the next chapter. I have also gone fully into this valuable aid in "Riding and Schooling." *The horse takes great notice of our voices, and he can understand an extraordinary amount of our speech. He can detect the difference in tones to a wonderful extent. It is* chiefly the tone he understands, because often different words pronounced in exactly the same tone will produce the same effect. He rapidly commits these different tones to memory. As the horse's sense of hearing and of detecting sounds is very acute, we should never shout at him except in very exceptional cases, as to stop him from kicking, when a sharp reprimand should prevent the act. One can always do more with a young horse that has never been handled by a groom, who shouts as if the horse had bad hearing, because one can talk quietly to the animal. A horse can hear a whisper, and this quiet manner of talking while training has most beneficial results. On the other hand, the voice should not be used too much with a trained horse. As we shall see later, the voice is gradually used less in conjunction with the aids, until it can be dispensed with altogether.

When in fear, the voice is the greatest aid we have and is the best means of subduing the horse. He loves to hear our voice under such conditions. The voice has an extraordinary influence on horses about to stampede. I well recollect many instances in the North-West of hundreds of horses being stopped from stampeding by the voice of one man.

PSYCHOLOGY OF THE HORSE

The degree to which a horse will understand the voice in his training depends, of course, on his intelligence. As a rule, the better he is bred the better will be his intelligence. A horse that has been made bad-tempered and that is well-bred is a much more dangerous animal, as he may take us when off our guard. Our voice, our indications and our punishments may not have the slightest effect upon him. Such a horse, when first brought in from pasture, will act much more quietly than after he has been fed on grain.

The Horse's Memory.—The horse's memory is extraordinary, and it is upon this faculty that we base our system of education. In no respect is this faculty so evident as in the manner in which he notices fresh objects. I have taken a horse along a street for the first time and, knowing it to be a strange street, he has not shied at anything; yet, in going along the same street two months after, he has shied and shown fear at a house, and even at a box on the side of the road that was not there before. There were similar boxes in other places the first time, but he took no notice of them. I took another horse along a road and around a *bend where there was a heap of old machinery, at which he shied; two months after, on going along the same road, when we* approached this corner he hesitated and prepared to shy, but the machinery had gone.

If a horse has once been ill-treated by a man he will never forget. I know of a stallion who was shamefully mutilated by a veterinary surgeon; five years afterwards, he met this man when he was at liberty and would certainly have killed him had not his groom come to the rescue.

If a horse has experienced fear of an object, or has been hurt by it, he remembers it and seeks to escape from it the next time he sees it. If he is forced up to it this will only increase his fear.

I could mention many instances where one has taken a horse out to a certain place and called at another house en route, that has been considerably off the direct line, yet, on returning home, the horse has wanted to call at the house again. It is quite common for hunters and hacks in England to want to stop at public-houses where they have been used to calling while being exercised by a groom.

Outward Signs.—To the student and to the observant trainer, the horse's outward signs are a wonderful indication of character. The ears are a faithful index. He pricks them forward when he is viewing an object intently, or when afraid of something, or when about to jump an object. He depresses them backwards when feeling in a bad temper, when approached by another horse or a man to whom he objects, or when irritated by something that is tickling. He turns them backwards, or turns one back only, to receive sounds from his rider or driver. A highly-strung horse will often go along with one ear forward and the other back, or he may continually oscillate one or both ears.

A quiet eye shows a quiet disposition, and a lively one the opposite. A restless eye means an uncertain disposition, so the trainer must look for resistance and not be caught off his guard. Such horses often show an abnormal amount of the white of the eye: but the showing of an excess of the white does not necessarily mean a bad temper.

The shape of the profile is a good indicator. A bump on the forehead generally means stubbornness, and if combined with a dish-face is a sure sign of self-will and, perhaps, a disagreeable character.

We have already mentioned neighs, whinnies and groans. A horse snorts from fear or from anger, or when smelling a disagreeable odour. He raises his upper lip and nose when he objects to a taste or an odour.

Swishing the tail is common with some horses of an irritable disposition—more frequent with mares—and is generally caused by hasty driving and bad hands.

A driver with bad hands may cause a horse to endeavour to grab the reins with the tail to ease the aching mouth. Swishing the tail may be the result of excitement, obstinacy, bladder trouble, or temper.

A tail held high is generally the sign of good breeding. The horse may carry it very high when excited or when in fear. He may depress it from fear or in anticipation of being hit, and instinctively to protect his vital organs. A depressed tail may be a sign of sluggishness, poor breeding, fatigue or cold.

Stamping or pawing, and often kicking, are signs of impatience. Pawing may be due to internal pain. In this case, there will be sweating and the horse will look at his side.

Pointing a fore-foot means there is some form of pain therein. A staring coat means ill-health or excessive cold. Trembling generally means great fear, and is really distinct from shivering,

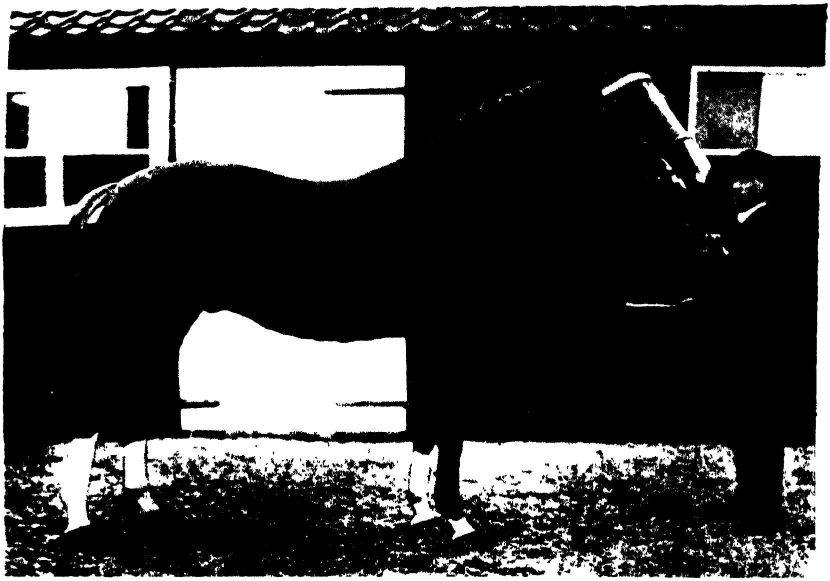


Photo: Sport and General

THOROUGHBRED HUNTER: RATHURDE

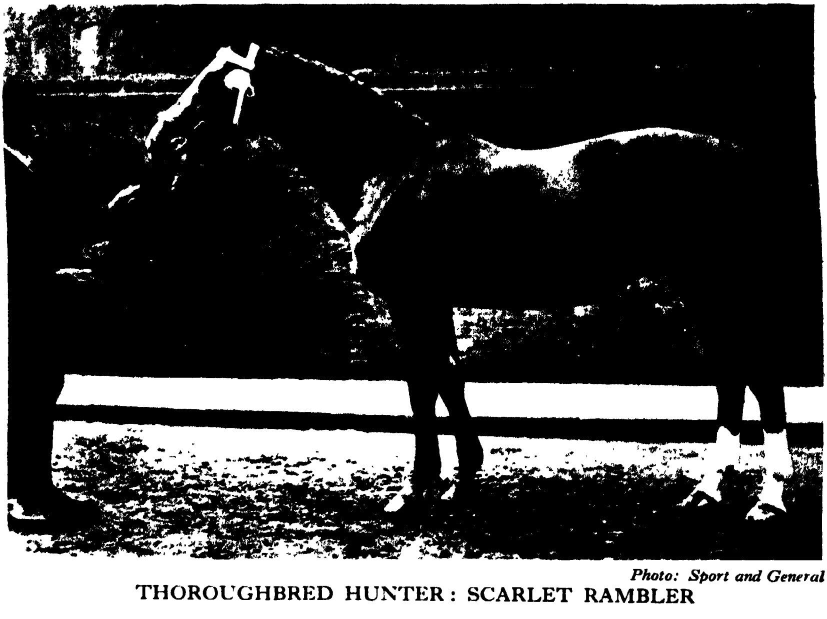


Photo: Sport and General

THOROUGHBRED HUNTER: SCARLET RAMBLER

THE CIRCUS HORSE

Photo: W. A. Rouch

CHARGER : PETER

which is caused by cold or the action of certain drugs, such as eserine.

Bright eyes, glossy coat, proudly-carried head, high tail, dry nostrils and a willing gait are the signs of good health and a contented horse.

Viciousness.—It has been stated often that some horses are naturally vicious. There is no such thing as a horse being born vicious. Viciousness is simply a product of bad handling. A foal may be predisposed to viciousness if bred from parents that had been made vicious—that is quite another story. Almost any horse can be made vicious if a bad enough man is put in charge of him. Mere teasing may make a horse vicious. The horse often rightly believes that man is vicious. We mutilate the defenceless horse and sear the wounds with red-hot irons. If we bring a horse up to be a devil we cannot expect the behaviour of an angel. If the horse is any good he will fight in self-defence. Can any horse be expected to remain sweet-tempered in a fly-pestered country like India or Canada (for example), if barbarous man chops off nature's weapon of defence against flies, or forces his head up in the skies by means of a senseless check-rein? Then why call a horse vicious?

A "wild" horse is not vicious. He fights simply in self-defence —with the worst type of Australian or Canadian "outlaw," there has never been any proof of viciousness, but ample proof of intense fear. I have seen many of these so-called vicious horses, and spent a year handling so-called "wild" horses in the North-West. Nothing was more evident than the intense fear exhibited by them. And no wonder, when one saw the noisy, harsh, unintelligent methods adopted by the "cow-boys."

If a horse is roped and thrown, hit and spurred, and everything else done to frighten him, can he be expected to submit to it like an obedient child?

Superiority of Man.—The horse does not instinctively believe man to be superior. In the first place, he probably thinks nothing about it: but if he does consider the matter, he thinks he is superior and tries to resist man. It is then that he discovers man's superiority. If our opposition fails, though, he realizes his real superior strength. Horses that have learnt this are quite difficult to handle, especially if they are of a determined disposition.

If we are trying to stop a horse doing a disobedient act and discover we are unable to do so, it is essential that we let him continue as if we had no wish to stop him. Our superior power is purely imaginary; and it is due to the horse's great imagination that we are able to deceive him as to which of us is superior in strength. It is a case of our brains against his. We cannot control a horse by brute strength; we could not stop a runaway horse by pulling with a leather rein if he knew that he was superior to man in strength.

If a horse starts to run back, it is foolish to try to hold him by the rein; we should rather let him run back; he will then think we want him to do so. If we tried to stop him, and failed, he would discover that he could oppose our efforts. If we *cause him to run farther back after he has attempted to stop, we shall make a better impression on him and make him dislike running back.*

Our principle is to prevent the horse doing what he wants to do and that we do not want him to do, and to make him do what we want, little by little, caressing him whenever he obeys and punishing him, ever so slightly, when he disobeys. As in a child, nearly all disobedient acts are those learnt through the child being able to do what he was told not to do; so in the horse, this is the chief cause of disobedience. We must, therefore, be most careful to stop disobedient acts from the first.

Want of exercise and, therefore, excessive exuberance of spirits, may cause refractory action and teach a horse his superiority in strength. Or he may learn it when abused by a brute and forced to act in self-defence. All brutes are cowards. A coward generally chooses a timid horse that will not act in self-defence. A spirited horse detests the very sight of a coward. This is the type of man that is responsible for most bad horses; he is a bully. When the horse acts in self-defence, the coward runs away, or ceases to abuse the horse, who learns that by attacking he defeats his opponent —he has gained knowledge of his real superiority over men.

The best trainers have a very strong influence over any horse they attempt to handle. Personality has a great deal to do with successful horse education. I have never seen a weak-charactered man yet that could do anything worth while with a horse. A horse is a great judge of human character.

In the past we have heard of numerous cases of horse trainers having an almost supernatural influence over horses. I think it was simply a case of a superior mind amongst less intelligent people; the latter thinking the trainer was bewitched.

In Cork, about 1810, a rustic, James Sullivan, had an extraordinary influence over unmanageable horses. He took them alone into a barn for half an hour or so, and no one ever saw what he did. But he would be found, after onlookers were admitted, to be lying down with the horse, which was permanently subdued and reconciled to man.

There was a book, "Le Diable Bossu," printed at Nancy, in 1708, wherein was described an English horse, which had been taught to distinguish cards, and which was burnt alive at Lisbon in 1707. In the previous century Shakespeare refers in *Love's Labour's Lost* to Banke's famous Marocco as a dancing horse.

Obedience.—As explained previously, a horse must not be allowed to do an act that shows disobedience. Fortunately, he readily obeys. *A horse is a most extraordinarily obedient animal. Love must be gained before obedience is taught*; without love (affection for the trainer) the horse will never be made really obedient. The stronger the horse physically, and the better his feeding, the greater must be his obedience. To obtain a high degree of obedience, the horse must have a good disposition. Such a horse likes obedience; it pleases him to please us, because it is one of his instincts to seek pleasure, and by pleasing us he receives caresses and titbits, which associate pleasure in his mind.

We obtain obedience in the horse by means of love and fear. By means of love alone he would be tempted to obey his own impulses; by both, we persuade him to obey us. Physical force may be adopted to obtain physical obedience, but this only increases fear; producing obedience as long as the physical force exists, and, perhaps, for a very short time after. This method would spoil the horse.

The whole secret of imparting love and fear in the right proportions is an acquisition gained by few. The knowledge of successful horse-training is a very rare gift, and the faculty of obtaining obedience from the equine pupil is the most difficult duty of the master.

It is useless to try to obtain obedience until we have obtained love and confidence; because, before we can obtain obedience, we must resort to a certain amount of mild punishment in order to inspire fear.

If we inflict punishment before we have gained a horse's confidence, we shall cause him to hate us, to try to flee from us; he will misunderstand the punishment and think we are doing him harm. In rare cases, punishment may have to be given before confidence is gained, but only a trainer of wide experience will know when this is necessary.

All acts that make the horse do what we want him to do and prevent him doing what we do not want him to do, tend to gain obedience.

If a horse wants to turn down one road and we prevent him, *we teach him our superiority; but if we are unable to do so, and he goes down, he learns that he can satisfy his own wants and disobey us. Therefore let him go willingly, if there is any doubt as to* being able to stop him. Obedience may be obtained temporarily by his great power of self-preservation, which is an instinct, but this will be uncommon.

Physical pain may cause a horse to be disobedient. For example: I was reining back a horse who suddenly refused to go another step; suspecting physical disobedience, I dismounted and found a small curb on one hock. This was causing pain while reining-back, and hence the apparent obstinacy.

The expert way to teach obedience in the early stages is to be helped by an assistant, and to use a cavesson and leading-rein. The trainer, too, is on foot. The horse will be led about and coaxed to do things, being punished slightly for disobedient acts. Great care must be taken that the horse really understands what is required of him. Most apparent disobedience is caused by the horse being asked to do something that he does not understand.

The horse quickly picks up what we teach him, if he is taught the right way. He might often be considered slow at learning; but much apparent slowness is due to wrong methods of teaching. He may be a little slow at learning, but he never forgets. Lessons should be short and repeated often, in order not to strain or tire the muscles. Training must never be hurried, as this may cause serious physical harm, and spoil the horse's disposition.

Reactions.—When a horse is disobedient he makes a reaction. We can physically prevent a horse making most reactions by placing his body in a position in which he cannot make the preliminary motion. But to stop a horse attacking his rider or groom is more difficult. In the first place, he probably attacked in self-defence. The man became afraid, and ran away. This attacking soon became a habit, because the horse learnt to detest the man and found he was his superior. Later, he may attack without reason. The cure for this, whether it is a habit or not, is kindness and no punishment. The horse must cease to look upon man as an enemy. He must also be placed in a position in which he cannot attack; he will then learn man's superiority. We must show him that his attacks do not harm.

Many reactions are made by the horse easing himself of pain or irritation. A rider may be hurting a horse's mouth—the horse bucks him off and eases his mouth. The next time he has his mouth hurt, he does the same, because he associates his action with *relief. The reaction becomes a vice.*

If a horse succeeds in refusing to do an act demanded by a weak trainer, he has learnt a reaction.

If a horse when whipped or spurred is able to raise his croup, and the abuse stops, he has learnt a reaction. Reactions are always due to bad handling. A kicker is produced the same way. A horse kicks at his cruel attendant, who ceases to ill-treat him; he has learnt a reaction.

A timid rider may likewise cause a reaction. He applies certain aids with the leg; the horse objects and reacts; the rider is not strong enough to enforce his wishes and gives in. The horse will react the next time similar aids are applied.

Other causes of reaction are: too severe and too much punishment, causing the horse to dislike us and to fight instinctively against us; excessive exuberance of spirits; advancing his education too rapidly, and thus asking his body to do what it physically is unable to do. We cannot expect a man with six weeks' training to do a long-arm balance in the gymnasium, nor a recruit with two months' training to vault into the saddle of a galloping horse; then why do horse-trainers expect to develop the equine body in a few weeks, when it normally takes six to twelve months? Gradation is the essential factor in preparing the body; without which the animal evinces pain and, therefore, reacts. Our ignorance is responsible for all reactions.

The time required to make a horse give up bad habits depends on how long he has had them, and upon his character. Punishment will nearly always make matters worse. He must be prevented by physical means and knowledge of the aids, and caressed. If a horse has the habit of shying, which shows no viciousness, then physically to force him to approach the object before which he was beaten or spurred previously, would make him much worse. He must be placed under the same circumstances again and caressed. This is repeated until he takes no notice of the object.

With the very young colt reactions at first should be overlooked, as we must gain his confidence, and this only by love and absence of any punishing. A Thoroughbred requires much more tactful handling than a common-bred horse.

Caresses.—Kind treatment causes a horse to do well, because thereby he expects to be well treated. The horse is of greater value to its owner if he is a friend to him; therefore at all times we should treat the horse with the utmost justice.

The horse is particularly susceptible to receiving and appreciating caresses, unless he is very frightened or in a very bad temper. The best place to pat a horse is on the neck; this must not be done roughly, as it is so commonly, but gently and soothingly; nor should it be done so as to tickle and irritate. The horse likes being stroked or rubbed rather than being patted, as it more resembles the way his mother licked and caressed him on the neck *and about the head when he was a foal. Horses love being rubbed on the poll, in between the ears, unless they have been hit, or otherwise injured there. Some like being rubbed just above the eyes; others on the soft end of the muzzle—the upper lip.*

If a horse does not appear receptive to a caress, it means that he is either frightened or bad-tempered, and he should not be trusted until he has recovered from this temporary state. Caressing is a most valuable aid to our being able to gain the horse's will and affection. In training, its full use must never be forgotten. On the other hand, it can be overdone, and a horse can be easily spoiled. He should be treated like a child—kindly, but strictly.

Associations.—The horse's power of minute observation, combined with a wonderful memory, is of great value in his training. If objects have pleasant associations connected with them, he will, the next time he sees them, expect pleasant things to happen to him again. The horse associates objects that he sees, and acts that he performs, with either pleasant or unpleasant sensations. Remembering the horse's wonderful memory, our aim must be to try to associate objects and actions with pleasant sensations. This is the secret of successful horse-training. A horse in passing a motor shows a little fear and is whipped or spurred; he associates this pain with the car, and not with the foolish rider, and the next time he passes a car he anticipates pain, and shies to try and avoid it. In such a case he should have been caressed and shown that only pleasant things could arise from the presence of the motor. In passing a strange object the horse exhibits suspicion, fear and curiosity. The golden rule is never to punish if a horse shies at an object or shows fear, because it makes a bad association. If a horse while jumping is jerked in the mouth, he associates this pain with the jump, and not the bad hands or seat of the rider; he is thus made to dislike jumping, and will try to refuse next time. Similarly, if he is shouted at or whipped when doing his best, he will be encouraged next time not to do his best. This is too common with commercial drivers. Associations of pain may cause fear as well as hatred.

A horse that is made a kicker by ill-treatment associates being left alone with his kicking.

Some years ago, a horse of the Royal Horse Guards was a bad kicker and used to wear a red ribbon on his tail in the stable whenever there were strangers about. He had got so used to everyone avoiding him and behaving as if they were afraid of him, that he became thoroughly convinced he was man's superior. He disliked all people except the groom who fed him. Such a reputation did he get that no one would go near him, and in passing by his stall would give him a wide berth. The red ribbon was really the cause of most of his behaviour. One day, much to the astonishment of the attendant, I walked up to this horse, exactly as I would any other horse, smacked him on the rump and then went up to the front of the stall. The horse was taken aback; he had discovered someone besides his groom who was not his enemy, and he behaved perfectly normally. Had I hesitated and acted in the silly way of his supposed enemies, I should have been kicked, or kicked at, and should have deserved it. The reader will notice that I went right up to the horse, because had he then lashed out —which was very unlikely—he would have lifted me with his hocks and not struck me with the iron shoes at the ends of his long limbs. If a horse kicks out, it is always safest to jump towards him than away; he can do you no real harm if he catches you close up with his hocks.

A horse will associate things that are entirely foreign. For instance, I was bridling a well-bred horse one day in a low-roofed shed; I inadvertently passed my hand up in front of his face, and he threw his head up suddenly and cut it on a beam. For weeks afterwards it took me ten minutes to bridle him, as he associated the pain with the bridling, and not with his own action. Patience, however, cured him entirely of any fear of being bridled.

In bridling and harnessing horses, especially in putting on the crupper, in drenching or balling, in shoeing and in any operation of like nature, great care must be taken not to abuse the horse or to cause him to become afraid. If he is abused he will be much worse the next time to bridle, shoe, etc. He will associate receiving the bit into his mouth, or the crupper under his tail, or the drench, or the nailing on of the shoe, with the pain and will fight against such actions the next time. One sees the most idiotic treatment of horses in such cases. Abuse will never do good; extreme patience, kindness and common sense are required from the first. Much future loss of time and aggravation will be saved.

Fear.—Fear in horses is contagious, and is very peculiar in its degree and causes. It will prompt a horse to do very strange things. The horse is very susceptible to fear, which is inconvenient; although its existence helps us to be his master. Fear causes a horse to be careful not to fall down, to be careful not to place his foot in a rabbit hole, not to go into puddles and so on, and therefore increases his usefulness and safety. Fear causes the horse to understand the whip actions.

As fear very easily increases in intensity, we should at all times aim at subduing it. A horse with little intelligence is more dangerous than one of better education, whilst very timid horses when in fear are most dangerous, because they may fall or take their rider into great danger. We know of one horse that actually, through fear, jumped over London Bridge into the Thames. Fortunately, neither horse nor rider was hurt. A timid horse in fear is better dismounted and led at once. The presence of a man on a horse's back—especially one who has affection for the horse—generally allays much of the fear. Fear is really a belief of danger, and varies with the momentary state of the horse's mind. Mares are generally more prone to fear.

The horse shies at new objects because they frighten him. He fears noises, smells and being touched suddenly. He should be able to see the object he is afraid of; therefore, blinkers should never be used.

A horse subject to shying or starting suddenly at sight of any unfamiliar object, such as a rustling leaf or a bird flying out of the hedge, should be petted and never whipped. The shying is due to nervousness, and in many cases to defective eyesight, most commonly long sight, or, not uncommonly, by dark stables. When coming out of a dark stable into bright daylight, the tendency to shy will be increased. When a horse is thus frightened he should be coaxed forward with a steady feel on the mouth and the use of the voice; or if being ridden, by a stroking of the neck. We must give confidence to the horse. Let him see and smell the object he is afraid of. Horses have a great objection to strong, disagreeable odours. Horses fear blood. Some of the scenes that were witnessed on the Continent in the disgraceful decrepit horse traffic were intensely distressing and no credit to those responsible.

A horse is more susceptible to fear when at speed; it often causes a horse to run away, and when at speed the fear increases; hence it is so difficult to stop a runaway. A runaway, when he does stop and realizes that he is abandoned, feels great fear. All horses when in fear like company, and generally the voice of a master will cause much comfort. When in fear, the horse should not be worked; kind treatment should be resorted to. Fear may be so great as to cause trembling; the rider can often feel the heart pulsations from the saddle. Horse-dealers, who are up to any trick to enhance the price of a horse, will often cause fear so that the horse's attention is distracted from the pain in an injured limb. In all cases of fear there will be a preliminary sign given by the horse, which should be detected by a good horseman so that he will be forewarned.

Before we can prevent fear in a horse we must gain his confidence and then his obedience. Two young horses should not be driven together; the fear of the one will increase that of the other. In the first place, the horse should be taught in a school, where his attention can be held, then led around streets and finally ridden. During the leading, one or two assistants may be used.

The signs of fear are: intently looking or listening in a certain direction, shown by the horse holding his head high, ears pricked, and standing as if on his toes; moving his ears to and fro, or bending his neck in the direction of the object; snorting; shying from the object; stopping suddenly, or reducing the pace and perhaps rearing. An object coming towards him might cause him to rear. Other signs are grunting, depressing the tail, raising the tail high, and, if the fear is intense, trembling.

The means of preventing fear are: caressing and placing oneself between the horse and object; the voice; patience and the company of another horse.

Punishment.—Santa Paulina, three centuries ago, when speaking of horses, said: "Prevention is better than cure." Horsemen should never forget this. Trust must be obtained before punishment is given. A horse must never be punished while the trainer is in a bad temper. If this rule is ever broken, disastrous effects will result. The trainer, when in a bad temper, had far better put the horse back in the stable and have a quiet smoke. A threat is generally best given before punishment is resorted to, and then the punishment should be given mildly. The trainer should never stand in front of the horse while punishing him. Never hit a horse on the shoulder while riding him, but behind the saddle; never underneath; and when driving, the horse should be hit on the back. If the trainer is standing on the ground the whip should be used on the flank or back, never on the legs.

Impunity is an inducement to crime, so a wilfully disobedient act must never be let pass. It is difficult at times to determine whether the horse does not understand or is deliberately disobeying. The former is the more common. It is horse-sense and horse-tact that tell the skilful trainer the cause of disobedience. Horses vary immensely as to the degree of punishment that should be given. A high-spirited horse may have to be punished early, whilst a timid horse may be entirely discouraged by punishment.

The theory of punishment is that, if a horse refuses to do a thing asked of him, he is punished, and thus learns to avoid the pain produced by doing what he is asked to do; still more, he is caressed for doing it. Further, the association of pleasure or displeasure must immediately follow the action.

A late punishment will be taken as an ill-treatment and will spoil him. If he cannot be punished at the time, he must not be punished at all. He will not be able to associate late punishment with his disobedient act. A horse should also be caressed a short time after being punished, so as not to leave too deep an impression upon his mind, which would cause a feeling of enmity. A horse must never be nagged at. Only a few minutes should elapse between a punishment and a caress to assure him we are his friend.

If possible, the punishment should be inflicted while the disobedient act is being committed; for example, while the horse's hind legs are in the air in the act of kicking, when he should be hit under the belly. This is the only occasion that he should be so hit. He learns that he is hit for raising his hind-quarters and exposing his belly.

Punishment should be as rare as possible. The horse will soon understand that he is caressed when he obeys; bearing this in mind, the rare use of punishment is of great value. A previously ill-used horse may act strangely; he should not be punished, but great patience and perseverance resorted to. Punishment in such circumstances would do much harm.

A horse must never be punished when in fear; punishment increases fear, it can never diminish it, for the horse regards anything associated with a punishment as the cause of the pain. A horse must never be punished when he is doing his best; a very common abuse amongst drivers. When a balking horse starts, he must never, on any account, be hit, or he will associate his going forward with being punished.

The horse's skin varies in thickness, so that certain parts feel pain more readily than others. The skin on the legs is thick, as a protection against thorns and cold. It is thin in between the thighs, on the flanks, under the belly and behind the shoulders.

It is the existence of fear of punishment that enables us to get obedience. Never be brutal; cruelty has never done good to any horse. It is at times strange that the horse should accept us as his master when he sees our many failings, our cowardice, brutality, selfishness, and such excesses as drunkenness.

Maximum remedium iræ mora est.

CHAPTER III

THE PRINCIPLES OF TRAINING

Da spatium tenuemque moram; male cuncta ministrat impetus

As this book is essentially a treatise on horse management, it is not proposed to go into the details of training, but to lay down only the principles that govern it, which are the same whether the horse is for driving, hunting, polo, or performance jumping. I have gone into the application of these principles and the details for training the riding-horse in "Riding and Schooling."

Horsemanship might be defined as tact in the handling of horses.

Equitation is the science of training the horse to use and develop his muscles so that his powers become absolutely submissive to the rider's brains without pain or discomfort, so that both rider and horse are in perfect equilibrium and happy. This cannot be attained without a thorough understanding of the horse's mind as dealt with in the preceding chapter.

A successful trainer must have a natural love for horses; it cannot be acquired. The amount of time and teaching required to train a horse varies greatly, as it depends on the spirit and intelligence of that horse; but it must be thoroughly understood that training cannot be hurried—it is a slow, gradual process. The mind and the body have to be developed gradually and consistently. Too rapid progress will only, in the end, cause retrogression and a loss in advancement. Horses need better training now than ever, because they have to be made accustomed to any kind of sight, sound and smell, and to any kind of footing. It takes two years to make a good hunter or polo pony, and properly to train a show jumper much longer.

Proper training and good manners increase the value of a horse many times.

When his training is considered finished, it does not mean that further education must cease—far from it! His education should continue for many years. Opportunities should never be lost to brush up his former lessons, to educate the mind still further, and to improve him by some careful schooling.

It is likewise as important to remember that a well-trained horse can be almost ruined in a month in the hands of a thoroughly bad horseman.

The principles laid down here, it is hoped, will prevent much of the abuse that is so common in the handling of young horses and permit of the animal being trained humanely, progressively and with common-sense methods.

Hints for the Trainer.—*In the past, there were many* wonderful horse-breakers—using the term in its literal sense—who gave performances before the public. They based their principles upon the idea of subduing the horse by brute force, by exhaustion or by fear. A horse so broken will never have the heart of one trained by modern methods, nor will he ever have the physical ability or the intelligence. The will and physical power were broken from the first.

The principle should be to retain all the fine qualities of the horse, and to educate, control, govern, direct and manage him by skill, knowledge, tact, patience and self-control. There are few fit to train a horse, because there are few who have the real love for a horse and who will take the trouble to understand him.

A horse-trainer must know his own weak points, because any display of weakness of character will be seized upon by the pupil. He must have perfect control over himself, great patience, pluck and gentleness, allied with firmness. He must know how to display his apparent superiority of strength by not demanding of the horse anything that he cannot prevent him from reacting against. He must know how to combat the horse's strength, without resorting to cruelty. No two horses are alike, and every allowance must be made for backward pupils. Humane methods are the only ones that will produce permanent results; we must gain confidence and obedience, dissipate fear—except a mild fear of punishment for disobedience—and train the horse mentally and physically.

So-called "wild" horses—those unaccustomed to being handled while quite young—require extra kindness and patience when first handled, in order to gain love and respect, and banish fear. A small slip with such an animal will cause loss of confidence.

We must remember that a horse is not naturally vicious. He is most amiable and willing. I have proved that the worst so-called "outlaw" or vicious western horse has not an ounce of vice *in it, but is in mortal fear of human people.*

Professors McGillivray and Skuthorp and others have written most ably on the subject, and have shown their wonderful modern methods of educating the prairie horse by the most gentle and humane methods. Such horses have been many times superior to their brothers broken by the crude methods generally practised on ranches. Rarey, Sample, Hyland, Leightwark and Galvayn, great as they were in their horse-breaking methods, resorted to the principle of subduing first of all; hence their successes never reached those of McGillivray and Skuthorp.

When put to a test, the subdued horse will give in long before the humanely trained one. There is absolutely no comparison between the value of the two animals for saddle work, driving or any form of sport.

It is unfortunate that in the past many cruel horse-breakers have met with considerable success, their success being merely comparative; and others have, therefore, followed on the same lines. There is none so cruel as the coward who has attained success.

It is much more important to make the horse docile and quiet in his early training than it is to obtain correctness of paces. The horse must be made happy. It is often very difficult to choose a suitable trainer for a particular type of horse. And it requires great talent to judge the time required for work, the rate of progress, the extent of reward and reprimand.

Feeding in Training.—During the training period the horse must be fed on good food, which must be increased in quantity as the training and condition progress. (*See* Chapter VI.) The old idea of keeping the horse quiet and free from high spirits is wrong. It hinders our education of the pupil. A full stomach means contentedness. If he is suffering from over-exuberance of spirits, he is better exercised dismounted, preferably with the lunging rein or long reins.

Exercise.—The safest and best way to exercise a young horse is with the lunging rein and cavesson, using a lunging whip to keep him on the outside of the circle. The whip should be used as an indicator and not as a means of punishment, for we must gain the animal's love and confidence before we resort to any form of punishment. Little reactions at first can be overlooked.

Idleness is the root of all evil. Want of exercise causes an overstock of energy that irritates a horse. This will tend to cause reactions. While in this condition, the horse must not be trained.

Lunging.—*As our object in training is to start at the horse's head, the lunging rein and cavesson are of great value, as they control the head. It is very easy to obtain obedience with the lunging method; it is impossible for the horse to run out when* lunged on a circle, and difficult for him to run in, because we show him the whip and teach him to keep away from the centre of the circle. We soon teach him to go forward, and by continually halting him we bring him into the centre and give him a caress, and a tit-bit. Very soon he obeys us, and by always using the same words for each act demanded, he soon learns what is required by each of our commands or each of our movements. Consistency is essential or the pupil will be muddled. He soon learns obedience. He associates going forward, or halting, with caresses, and reactions with the sight of the whip. An assistant should be available in the early stages.

When confidence has been gained and the horse shows no further signs of being timid, it may be necessary to use the whip a little, especially if he shows any signs of obstinacy and attempts to react. To gain complete obedience the pupil must have mild fear of punishment.

Lack of exercise makes it more difficult to hold the horse's attention. We *must* secure his attention and confidence. Associations of pleasure must immediately follow obedience, and of displeasure follow disobedience. We must be absolutely sure that he is physically able to perform the act asked of him. We must develop, stage by stage, his various muscles, etc., and prepare his body so that he feels no inconvenience in performing these acts. Absence of gradation causes opposition.

Lessons must not be too long. Half an hour two or three times a day is far better than the work being given at one period. He should be repeatedly rested and caressed; this eases his mind. Muscles and ligaments must never be tired, nor the temper ruffled.

The closed school or manège with walls is of great value in early training. It is so much easier to hold the pupils' attention therein. Some trainers use the double long reins in the place of the lunging reins in the early lessons dismounted. Good results can be obtained from the long reins, but they should never be fastened to the bit, but to the sides of the head-collar or cavesson.

The cavesson that has a metal nose-band must be well padded *inside. Leather nose-bands are far better and should invariably* be used.

Mouthing.—It is usual to mouth a young horse for some months before his early schooling by having a snaffle-bit put in his mouth for half an hour twice a day. It is a good plan, sometimes, to have the horse on the pillar-reins while so bitted; or a pair of loose side-reins and roller can be put on. So much, however, depends on the horse. Great care must be taken to have a snaffle high enough in the mouth to prevent the horse getting his tongue over it. (*See* page 112.) A horse must keep his mouth wet while being mouthed. If he will not, a little camphor cream on the bit will generally suffice. While riding the horse, a little grass given to him will serve the purpose. While mouthing, the horse must play with his bit; a curb-chain hung with the bridoon will often help a horse that has ceased to keep his mouth wet.

If, while working in long reins, the horse should get a leg over a rein, on no account pull him up suddenly and frighten him; if possible, let him go on and learn that the rein will not hurt him. The same applies when harness is first used.

Later on, a horse requires considerable work outside to avoid his action becoming cramped. The age and the stage of his training at which he is mounted depend on his conformation and condition. Some very highly-trained horses are mounted almost from the first. But, of course, it is not wise generally to mount a horse too young. It all depends on the build, weight and condition. It is better to wait until the pupil is four years old before mounting. The early training is better not started before three. But the handling and development of his intelligence should be started at foalhood, and continued without a break.

It must be remembered that many well-trained horses were never lunged or driven with long reins, but they were handled by exceptionally good riders with good hands.

We must aim at freedom of action, therefore much of the horse's work must be done while in motion. We must insist on obedience; we must not ask him to follow us on the halter or rein if we cannot make him do so, nor ask him to halt if we are not able to enforce this. If he learns that he need not halt, he will wander all over the school; or, if he need not follow, he may even object to being tied up with a halter in the stable.

It may be necessary, in order to teach some of the lessons, to employ one or even two assistants with reins attached to the

Photo: G. H.

THOROUGHBRED : WILDFOWLER

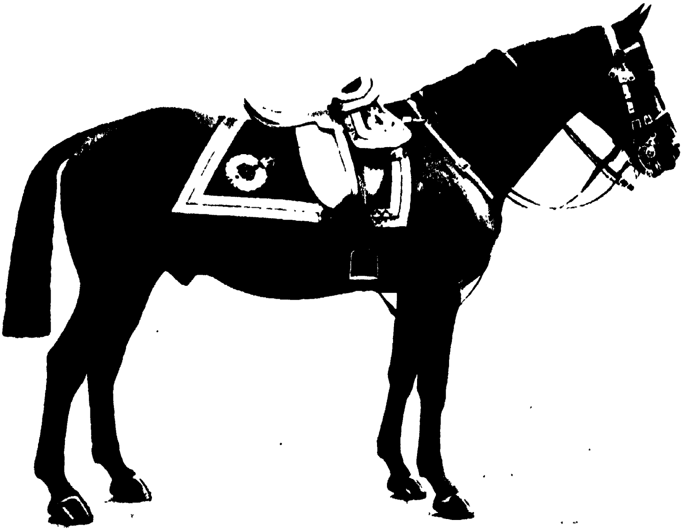


Photo: W. A. Rouch

CHARGER : KILDARE

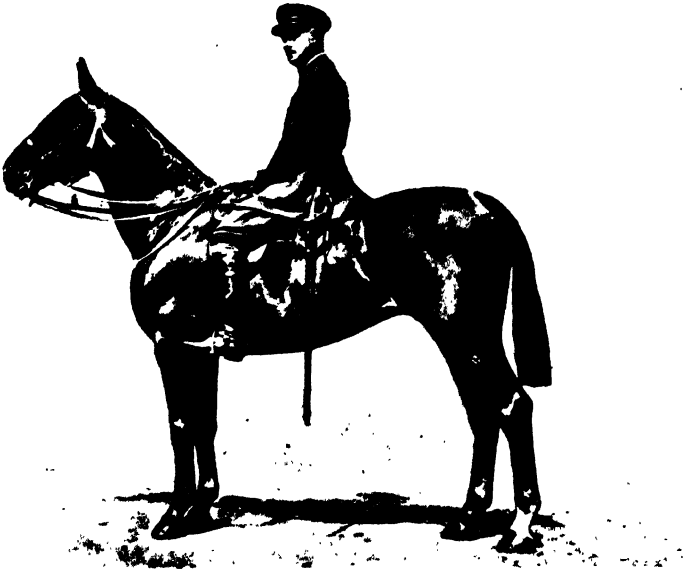


Photo: W. A. Rouch

CHARGER: HERCULES

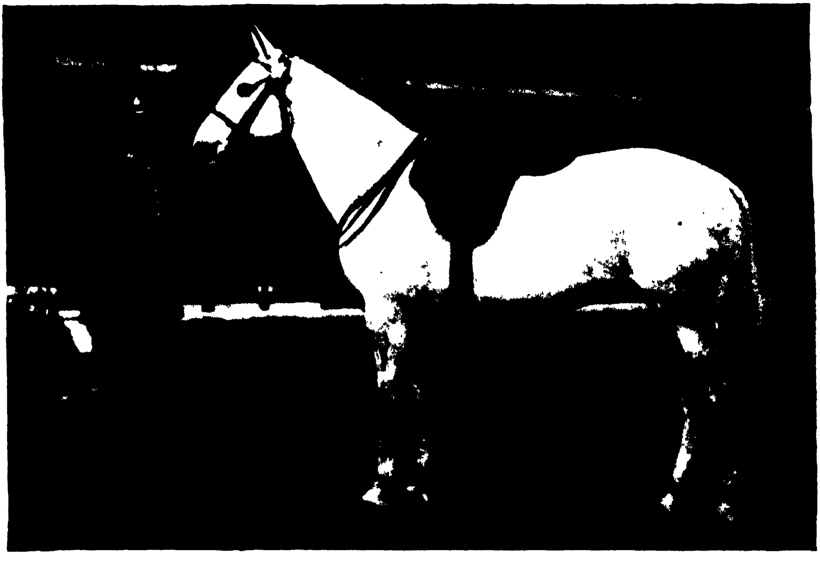


Photo: W. A. Rouch

POLICE MOUNT: QUICKSILVER

cavesson, in leading the horse about the school, in the leading lesson, the halt, and the turns or rein-back; but, generally speaking, the trainer can manage without help.

We must never tie a horse up with a rope that he can break; if he should break it he will have learned a very bad habit.

A horse that has a good will and a good disposition is easy to train; whilst a timid horse will not have sufficient spirit to go through the work. Horses vary so much that a great deal of common sense and tact are necessary for success in dealing with them.

Mounting.—Much of the early portion of the horse's training should be done dismounted; the trainer being at the horse's head, or near to him, is often better able to exercise control. The young horse should, however, be accustomed quite early to having his trainer, or a lighter man, mounted on his back. This is best done by having the man raised quietly by an assistant on to the horse's back, in the stall, with the rug on. The horse must be made to understand that he is not going to be hurt, and be made accustomed to be handled and played about with. Unless the horse is weak, he can be mounted in this way when a two-year-old. Greater attention can be got from the horse if he is alone in his early exercises in the school. The trainer, while dismounted, is, as a rule, better able to resist reactions. Another great advantage of this dismounted training is that success does not so much depend on good hands and seat, as it does in mounted training. (*See* page 48.)

Action Lessons.—In teaching a horse to perform an act, the principle is to give rise to ideas we desire in him. We may do this by setting an example: for instance, getting him to follow a man, or the trainer, jumping over a bar in front of him, etc. Or we may let him see objects, see our movements, or feel certain aids or indications that will call forth these ideas in his mind.

At the same time we must prevent ideas arising in his mind that would cause him to do things against our wish: for instance, in passing a motor-car, he may shy away from it and get the idea next time that he does not have to pass close to it, and he will keep away from it.

In teaching the horse to perform actions, we must be careful to give him indications that he can understand, things suited to give rise to the actions we require. He will thus associate certain indications or aids with certain movements, and in time, on account

The same associations must be given for the same actions, and the horse must not be asked to do what he is not physically *able to perform easily. Gradation is essential. The voice is used in conjunction with all aids. Sounds will thus become associated with different movements. The word "Whoa" should only be used when the horse is in motion, and he is required to halt.* It should not be used in quietening a horse or approaching him in his stall, but some other word, as "Steady." Generally, the voice is gradually dispensed with and the aid used alone; but with circus horses or trick horses the voice is often used without the aid. This is how the so-called "talking" horse is made. The voice should always be used in a soothing tone. When the horse is frightened, and if it is timid, the rider would do better to dismount and go to his head. A horse will do anything for the man he knows and loves.

The Use of Music.—Music has been used to assist in training horses. As a rule, they love quiet music, although, until they become used to it, they may be a little afraid. Horses' ears being acute, they do not like noisy drums or horribly screechy musicless jazz. Horses are taught to walk, trot and canter to various tunes, and afterwards these tunes will cause them to assume the paces suited to them. This is amply demonstrated in the ever-popular " musical rides." The colonel of one cavalry regiment forbade young horses being used in musical rides, because whenever they heard the strains of "Bonnie Dundee" on parade they would break into a canter.

Standing.—The horse must not be expected to do things against his nature. If he will not stand alone he must not be punished. No horse will stand still alone for any considerable length of time.

In teaching him to stand, we must try for a quarter of an hour for several days. One method is to put the reins over his head and tie a small sack to them, so that when he advances he will tread on the sack and pull on his mouth. Later, the sack is dispensed with and the reins alone thrown over his head. Another way is to have two men hold the horse with strings attached to the cavesson, using the word "Whoa" whenever he moves; and later to replace the strings with black thread; moving farther and farther away. We must show him by caresses whenever he does right and, by voice, reprimand him whenever he does wrong.

The same principle applies in the case of *drenching a horse:* if he is treated kindly and given a tit-bit after taking the drench, he will like the sight of a drenching bottle; but if he is hurt in the mouth, his throat thumped, or he is in any way frightened, he will dislike the bottle and fight against it next time. The same applies in *picking up a horse's foot.* Do not shout or be rough. The horse is much stronger than you are. If he is abused, he will associate lifting his foot with ill-treatment. By proper treatment, any horse can be taught in a few days to pick up all his feet in order by merely beginning at the near fore with a light rub down the back of the cannon. I remember one horse I trained refusing to pick up one leg because the groom had not begun with the near fore.

If the young horse is being given rather severe work, it is a safe plan to use soft padded bandages on the fore-legs to avoid danger of injury, but under ordinary conditions, bandages should not be necessary as a common practice. If the legs fill, bandages can be put on for a few hours after work.

Indications.—After the horse has been given the same indications day after day, and performed the same actions, he becomes quite mechanical, and requires only the slightest indication to start performing these actions. Thus, in asking him to canter to the right on a circle, we feel both reins, the inner the stronger, close both legs, the outer the stronger, and lean very slightly inwards (to the right), and force him with the outer leg to strike off with the off fore-leg. It may be necessary, momentarily, to turn his neck slightly outwards to extend the *levator humeri* muscle that is attached to the arm-bone. He thus learns that he is to lead with the inner or right leg. After a while, however, we can make him do this by simply closing our legs and leaning slightly inwards.

A horse can soon be taught to go through a series of acts that he has repeatedly executed in the same order, by being given the indication for the first act. The circus horse is trained in this way.

Bitting.—If a horse refuses to open his mouth to receive the bit, a finger must be slipped in between the interdental spaces or in between the lips to cause him to open his mouth; the bit is then gently slipped in. On no account must it be forced in, or the horse in any way abused, and thus made to dislike the bit. I have spent weeks in making a bit-shy horse take the bit gently and nicely.

Mental Influence.—In catching a loose horse we must remain quiet, and approach him gently when his attention is distracted elsewhere. To chase after him, or to yell at him, will only excite him to motion. A runaway horse should not be chased, but cut off by making a detour.

A horse must never be teased. One that has been spoiled will be suspicious of further ill-treatment. He must be shown that we are his friends. Such a horse must be very sparingly punished until his affections and confidence are gained.

Some writers say that it is not worth while training a bad horse; this is a wrong idea. A bad horse, unless he has been ill-used for a long while, can be made into a good one if taken over by a competent horse-trainer.

The most successful horse-trainers have a strong personal influence over horses; they fascinate their pupils. It is very doubtful if a man has ever been able to hypnotize a horse, as this requires a deal of willing submission. Professor McEwen assured me that he was sure horses could neither be hypnotized nor mesmerized.

Jumping.—In training to jump, the horse must be made to like jumping from the first. The jumps should be solid or tied bars. First at liberty over low jumps of two feet. The lunging-rein or long rein may be used. Then he should be led over. The jumps should be gradually raised. If he rushes, take him backwards and forwards over the same jump. Do not get him excited. Reward him liberally, and do not make him sick of jumping.

When ridden it is best to have the same man on the horse until his training is well advanced.

The mouth, tongue, ears, lips, and hard palate should be examined every day.

Circus Horses.—There are some who advocate the abolition of the circus horse, and who claim that his life is a miserable one. I thoroughly agree that many animal acts in a circus should be abolished, but I am absolutely convinced that the average circus horse has a better and a happier life than the majority of horses, certainly than those that earn their board by hard work. I had charge of the training and showing of a regimental circus for many years (Plate facing p. 33) and also worked considerably with the famous Hanneford Circus family in schooling horses, and have made a point of investigating the training methods used by the leading circuses. A horse cannot be got to go nicely in circus work by being abused, and the methods used are far more humane than those used to break in 90 per cent. of horses, and very much more so than the methods used by riders in Europe and America in preparing both harness classes and jumping horses for shows.

A few remarks, therefore, on humane circus-horse training, and also on cruel methods that are sometimes practised, will not be out of place.

Philip Astley, about 1780, founded the modern circus and owned the Sanger's Amphitheatre in London. He was the father of the circus; a man endowed with a wonderful instinct for the training of horses, which implies an insight into and sympathy with the equine nature.

Any advanced degree in training can only be attained by humane methods. Our principle is, as in doing anything else with horses, "Not to do to the horse that which we would not have done to ourselves." If all horsemen went on these lines there would be many more good horsemen.

In the past there have been many horse-trainers who have shown wonderful exhibitions with the "horse at liberty." Until about two centuries ago these horse-trainers were considered by many to be magicians or sorcerers. We read of some of them being burnt alive, or otherwise punished, due to the public feeling that their power over the horse was evil.

A Neapolitan, named Pietro, had a little horse called Mauraco, whose naturally good disposition he turned to account. The horse performed the most wonderful tricks that Pietro had taught him. After many years, when at Arles, his performance caused such astonishment that he and his horse were both burnt alive in the public market-place.

The principles of training laid down in the earlier part of this chapter should be closely adhered to in preparing a horse for the circus, whether at liberty, in the ring or on the stage. In teaching him the various little tricks, we much watch him carefully to see that he does not become weary, that he understands our wishes and is physically able and fit to carry them out. When he reacts, *our difficulty* is to discover *if this is due to obstinacy, ill-temper, physical unfitness, or ignorance of our wishes. It is very often* due to our own bad indications and hasty methods.

In schooling the circus horse for an equestrian act, in which his duty is to canter around at a steady, slow pace, he should be given his early training on the lunging rein in the school. Then in the ring, which is 40 feet in diameter, and later, without the rein. The long whip should be used to keep him at the outside of the circle and at the correct pace.

This work must not be overdone. There is no finer exercise for a man than work on the bare-back of a circus horse. Once the horse has learnt to go nicely around at liberty, it is simply a case of great patience, and a little persevering trouble, to allow the horse to carry his rider, or several riders, on his back, sitting, kneeling and standing. The horse soon enters into the fun, if he is humanely treated and never sickened by having too much of it.

Although the ring-bank will keep the trained horse in, it is better to have the ring inside a school in the early training, as the horse will then be less likely to jump over the ring-bank.

In teaching a horse to perform "at liberty" in the ring—that is, to perform acts inside the ring at given signals from the hands and whip of the trainer—his early training is done in the ring on the lunging rein. He is taught to turn in to receive tit-bits, and to do various movements. The voice is always used with a definite movement of hands, whip and head, and even body, for each particular act. A horse may be taught to turn in by using a piece of black thread in the place of the rein; but, as a rule, the movement of the whip and trainer will suffice after the horse has turned in a few times on the lunging rein. A roller and side-reins are generally used to make him carry his neck well arched and prevent him getting out of control. The reins must not be too tight.

The whip will be held in the hand away from the direction the horse is moving, so that he will not see it ahead of him.

A different word and a different movement of hand and whip will be used for the horse to trot, to halt, to walk, to canter and to turn in, or to circle about, to go the other way, etc. In a very short time, the "horse at liberty" is taught to do many very pleasing and astonishing acts. But ample reward, and great patience and horse-sense are essential factors for success.

He will associate one movement and one sound with a particular act; later he will associate that particular movement alone with that act.

If the horse has been obedient in the first place, there will be little fear of reaction, so there will be little need for punishment. The trainer may go through the same movements, so far as he is able, with his own body as an example to the horse; for instance, he can walk, run, turn right-about or left-about. The horse watches the movements of his master very intently. Remember that the horse watches the movements of the hands very carefully.

The horse's attention must be kept on the trainer. A closed school therefore helps. The trainer must be most careful not to make movements that are not meant to be signals to the horse. In the advanced stage of training, due to the extraordinary observance of the horse, the trainer can give signals to the horse, who will perform the acts required, these signals being undetected by the audience. If the horse is too fresh at the beginning of a lesson, he must be exercised first. Never ask him to obey your signals when he is too fresh.

The training of the mind must be just as gradual as that of the body. Never weary or hurry the horse.

In training a horse to pick up and hold a handkerchief, the latter is sweetened with a little sugar or syrup and offered to him. With a very little patience he can be taught to take hold of it; the lips are then held shut for a few moments; he is then made to drop it, by, if necessary, pressing the finger in between his lips; a piece of sugar is then given. He will thus not want to chew up the handkerchief. An ordinary handkerchief is then used and, after he has handed it to the rider or man on foot, he is given the tit-bit.

In doing these acts, words of command must always be given, because afterwards he is made to do many of them by command only. Other acts he will be made to do by signals only. The horse is thus taught to pick up blocks of wood, pick out numbers or a certain coloured handkerchief, to stop, to paw the ground, to nod his head, to shake his head, and so on.

In picking out handkerchiefs or numbers he is taught by actions of the hand or whip. In pawing he is taught to move his leg when touched behind the knee with the whip, and then he will paw, on seeing the slight movement of the whip towards his knee. Thus, he is made to count. He says "Yes" by nodding; this is taught by the whip touching him under the chin, and he says "No" by shaking his head, which is taught by tickling his ears. Afterwards he makes that movement when he sees the whip moved in that direction.

By long patience, and absolutely no abuse, the horse's wonderful memory is made such use of, that he can be made to do apparently most wonderful tricks. A horse that will stop at a given signal can point out a certain lady in the audience with the black hat on, etc.

In teaching the stopping act, he is stopped by being held with a fine cord or thread tied to his bridle, accompanied by a certain movement of arm and whip, and a particular word of command. Later, the cord or thread, and then the voice, are dispensed with. He is caressed and given a tit-bit whenever he does right. Some trainers in the past have had very peculiar control over certain horses by the use of peculiar-smelling oils. It is impossible to discover exactly what these oils were.

The tricks that circus horses perform appear very marvellous to those who do not know how they are done.

With the horse, no cruel methods will bring results worth anything; necessary correction in the right place, given while the trainer's temper is under perfect control, is not cruelty. A trainer on the stage who adopts cruel methods can usually be discovered by experienced persons, and he merits the contempt of the community.

A strict supervision over all circus trainers cannot be kept by humane organizations, for the reasons that there are still many inferior so-called trainers who make a living by deceiving the public. These performances, which require no cleverness on the part of the trainer, astonish and amuse the public, because they are ignorant of the means employed. Such performances are happily becoming less common.

Some of the cruel methods adopted may be referred to: a noble rider comes home in distress at meeting misfortune, and his horse is supposed to share his master's grief. When offered a feed, he puts his muzzle into the basket or bucket and refuses to take it. The astonished audience are not aware that the poor horse has run his muzzle on to pins or other prickly articles in the vessel.

A horse who loses his master in one of the acts, refuses to eat during the rest of the performance. He is supposed to be mourning, but in reality his food is soaked in some drug of disagreeable odour. The mountebank used similar inhumane methods to deceive the public. He was too often a charlatan, because far greater skill than he ever possessed is required to train a horse properly. He posed as a superior school rider, but there was only one quality that he excelled in and that was the gift of talking.

HORSE-DEALERS

Some horse-dealers are the worst enemies the horse has. They are up to any low trick, from a temporary discomfort to the horse, to a criminal and life-long injury to fake the horse, deceive the purchaser, and fill their pockets.

In travelling far and wide, while purchasing army remounts, I have seen enough of some horse-dealers and their cowardly tricks to make me suspicious of horse-dealers as a class. Many, no doubt now, and more will in the future, practise their tricks on the purchaser of motor-cars.

With the horse drugs are used to kill pain temporarily; drugs that often eventually kill or permanently injure the animal. Drugs are used to give the horse false liveliness; over-feeding on soft feed, and no exercise to produce freshness and sleekness; hot stables to produce a shining coat; nerves are cut to hide lameness; or cocaine is used; and worst of all, a sound foot may be injured to prevent a horse showing lameness in a bad foot. Mutilation of any form to comply with any existing whim or fancy means nothing to this type of horse-dealer.

CHAPTER IV

CONDITION AND EXERCISE : TRANSPORTATION : RIDING : DRIVING

WHAT **Condition Means.**—Condition must not be confounded with fatness, which is distinguished by flabbiness and, perhaps, a distended stomach. Nor do we refer to the highly-pitched condition of the race-horse, which is trained to a high, nervous state, and on which no excess of flesh or fat is allowed. Special food, exercise and grooming or massaging are resorted to in order to secure this condition, and it cannot be maintained for an indefinite period. A reaction may set in if this state is not reduced gradually. Old race-horses that have been long in training are seldom any good for work.

Then again, the dealer's "condition" is of another kind; he aims at fatness, not fitness; and flabby and fattened muscles are the result. The whole system is unfit, and though he may start out in great spirits, the horse becomes fatigued very easily and very suddenly. Enforced idleness makes him exhibit high spirits when shown to the public, to prance about and forget minor soreness. The dealer uses the whip and much shouting to cause the horse to behave in a fresh and high-spirited manner, and by thus having his attention directed on the dealer and his string of horse-copers, he forgets to shy or take notice of his surroundings. The poor animal associates all this with previous cuts of the whip and is on his guard.

Blood, power and good looks, without condition, are of little value to a horse that is required to do strenuous work, such as the hunter, polo pony or service horse. By condition, we mean a body that is hard and well covered with flesh, a firm neck, glossy and silky coat, bright eye, fresh looks, good appetite, good digestion, normal urine (cloudy) and dung (*see* page 271), plenty of spirit, no running up light in the belly nor hollow in the flanks, and capability for doing long and continuous work. The condition that we require is that midway between the race-horse condition and the dealer's condition.

CONDITION AND EXERCISE

Conditioning Horses.—The only method of obtaining proper condition is to give the right amount of the best kind of the right food at the right time, judiciously combined with the right amount of the right exercise continued over a long period. This is no easy task. Added to this is the essential factor of sound stable management: punctuality and system in watering and feeding, exercising and grooming, together with the appreciation of each horse's requirements and habits, and a close study of his idiosyncrasies. To obtain the best results the horse should be fed by one man all the time.

Horsemanship is an important and economic science and should be studied very closely. Much judgment is needed in feeding and working. Proof of good horsemanship is shown by the ability to distinguish when the muscular development is satisfactory, and when the amount of work and food suits this development. When the horse is conditioned gradually, he does not lose much weight when put to severe work.

It is of the utmost importance to ascertain if a horse is feeding normally before he is taken out, and to ensure that the manger is always cleaned up at each meal. Many owners do not realize what condition is and how it is obtained, and this is why injuries and debility are so common. If horsemanship were properly studied, we should see far fewer horses that are unfit and unable to do the work required of them. Young horses need very careful attention when first brought to work; great care must be taken that they do not lose their flesh and bloom, which, if once lost through bad feeding or excessive work, are hard to regain.

A very steady gradation in the work and hard food is the secret of successful conditioning. Walking is the best exercise. Light draught work is excellent. The work given will depend on the horse's legs and condition. Beginning with a quarter ration and an hour's walk, the food, the work and grooming are gradually increased every few weeks. A careful watch must be kept for any signs of too rapid advancement. It requires much time to transform a really fat horse, and still longer to transform one that has been much run down by neglect. Asking poor-conditioned horses to do hard work is the cause of a very great many injured animals. It is the surest way to bring about lameness and diseased conditions, and is a sign of very bad horsemanship. It takes at least six months to get a soft horse into condition for steeplechasing; it may even take a year. We always allow at least a year to get an army remount into first-class condition for hard work on manœuvres.

Heating foods, such as peas and beans, are not good for young horses, but may be fed with advantage to old ones. The teeth must be examined and an eye kept on the dung and urine.

If the horse appears debilitated, worms must be suspected (*see* page 277). Those in the stomach do the most harm.

To keep the horse fit he must have proper rest at night and, indeed, at all times. Mate him properly in the stable and give him lots of room, a good bedding on a level floor, and plenty of fresh air, free from draughts. Give him all the water he will drink. Put him out on a breast-line during nice days. A loose-box is best, with a door that opens outside; the top half to be open whenever weather permits.

When once condition has been gained, hard work will do no harm; falls and minor accidents will not seriously affect the body, which is ready to stand strains and sprains. The tissues of an unconditioned horse will not withstand these; breakdowns are more often than not the result of lack of condition.

Work makes a hard-conditioned horse harder; in fact, without hard work, condition will go. A well-conditioned horse, if left idle for a few days and then given hard work will often get sick. Lymphangitis and azoturia are commonly caused in this manner. A horse in good condition should not be given more than a day's rest, and on that day his hard food must be halved. A soft feed is better given the night before. If for some days a horse has been doing only light work, care must be taken not to put him suddenly to hard labour; for that will probably cause azoturia (*see* page 279). His work must be easy at first, and increased gradually in severity and duration, extending over several days.

It is too common to see privately-owned horses left in perhaps for nearly a week and then given very severe work on Saturday and Sunday. Many good horses have been ruined permanently by this means. Conditioning must be cumulative; an hour's walking exercise a day is not nearly enough; at least two hours are required. Privately-owned horses suffer much more from lack of exercise and over-feeding than from over-work and poor food. Contractors must be carefully watched to see that the forage supplied is up to weight and standard quality. Neglect of this precaution is responsible for many horses being improperly fed.

Boiled oats and mashes are excellent food for the young horse at night. And the same may be said of linseed and roots. Most of the condition powders on the market should be avoided; many contain antimony oxide (black antimony), which does no good, but often harm.

Normally, a horse is better without drugs. A tablespoonful of saltpetre (nitre) in the water at night, once a month or so, may clear the blood and flush the kidneys, if the horse does not appear quite healthy, but it should not be adopted as a common practice. Over-feeding nitre is dangerous and far too general. Potassium salts in large quantities cause gastritis, and may cause death. They should never be given in inflammatory conditions of the bowels, bladder or kidneys.

It must be borne in mind that good condition will normally prevent galling, harness sores, and other such ailments.

Every working horse should be given one whole day's rest once a week. In the old days the London General Omnibus Company never worked their horses seven days a week, and one never saw fitter-looking animals.

It is the duty of every horse-owning firm to ensure a day of rest for their horses as well as their human employees. The special feeding of horses on their day of rest is essential: a half-ration of grain on the day and a hot mash the night before. Otherwise, on the following day, there will be the usual "Monday morning" ills: azoturia, lymphangitis, founder, etc. (*See* Chapters IX and XI.)

Condition Food and Powders.—A good Saturday night feed for one horse is: a bucket of bran, two ounces of liquorice, half a pound of powdered linseed; pour on boiling water and stir to make a pudding; cover, and feed when cool.

Two ounces of linseed oil on the feed every night is excellent for gaining condition and improving the coat. A teacupful of ground linseed will do nearly as well.

A very good condition powder is as follows:

Powdered sulphur . . .	2 oz. or 60 gm.
Potass. nitrate (Nitre) . . .	½ oz. or 15 gm.
Gentian Root	1 oz. or 30 gm.
Fenugreek	2 oz. or 60 gm.
Oil of Linseed	1 oz. or 30 cc.

Mix and make into powder. Give tablespoonful on dampened feed twice a day. The linseed can be replaced with iron sulphate (powdered).

Fowler's solution of arsenic may be given for a week in teaspoon-doses at night and then left off for a week and repeated. It is very easy to poison a horse with an overdose of arsenic, or by repeating the normal dose for too long.

Exercise.—By exercise we mean such work as is necessary to keep a horse in good health and to develop his natural powers. Work, in the ordinary sense, is the labour which a horse performs as demanded by man, and may be more severe or prolonged than the exercise that is essential to retain fitness. Work may be continued until it produces fatigue; but exercise should never be carried to this extent. The pleasure-horse seldom suffers from too much exercise, although it is not uncommon to see horses over-ridden in the hunting-field and at polo. Work-horses, on the other hand, are only too commonly overworked.

A horse in good condition requires at least two hours' good walking and steady trotting every day for exercise. One day a week he can be given a rest. Exercise is needed to maintain the balance between bodily waste and bodily repair. It should not be hurried. There is a common impression that if a horse covers a certain distance in a short time, he will derive as much benefit as if he covered it in two hours or a little more; this idea is entirely wrong. Abundant exercise plays a most important rôle in the maintenance of vitality or of healthy constitution, and offsetting the tendency to degeneracy that threatens all well-bred animals. The muscles, and every organ and tissue in the body, are stimulated in function, and this induces a greater blood supply to those parts. Secretions and excretions of every kind are stimulated; poisons are rapidly eliminated by the increased secretions of lungs, skin, kidneys, etc. With fast work, a horse may lose five times as much water through the skin and lungs as it will when at rest. (*See* Theory of Watering, page 160.) This induces health, by the removal of poisons from the system. Thus we must give the horse an abundance of water during hard work, and in hot weather, to satisfy his thirst, mentally and physically, and to maintain his condition.

If poisons are retained, the body is weakened and the resisting power against disease is lessened. The cells of under-exercised, pampered horses are weak, and when the cells increase, the new ones are also weak. Exercise, with all the factors of a natural and invigorating environment, is necessary to attain and maintain good health.

CONDITION AND EXERCISE

Exercise increases the bodily temperature, and cold water is necessary to regulate this rise; otherwise the skin becomes unnatural, hard and dry. So long as exercise is continued there is no danger of chill through cold water being given. Founder, colic and other ills result from hot and tired horses being watered and then left standing. Food also produces heat, so that horses exposed to cold climatic conditions, at pasture, or performing slow work, require additional heating food to maintain the bodily temperature.

Exercise, by keeping the muscles, ligaments and tendons in fit condition, greatly reduces the tendency for these tissues to suffer from strain or other injury. Exercise produces new tissue, partly by the formation of new fibres and partly by the enlarging of those already formed. Lymphangitis, founder, azoturia, etc., are the result of irregular exercise and unsuitable feeding.

Great care must be taken that the horse has eaten up his previous meal before he is taken out. Punctuality, system and appreciation of the horse's habits and peculiarities are essential.

Good food, such as oats, stimulates the horse to become excitable to motion; motion is necessary for the development of the young horse, hence the advantage of good feeding, and also of feeding grain to a young horse at pasture.

If a horse is unable to be exercised, his legs should be given a good hand-rubbing for ten minutes on each leg. Fresh air can often be given, even if exercise is not possible every day.

Hurried exercise will never get a horse fit; it will make him thin and tucked up. Jogging is bad; horses that continually jog seldom look fit or carry much flesh. It is the result of nervousness, bad riding, or freshness, and can be stopped.

A horse is better out three or four hours a day. The pace should be mostly at the walk, with slow, steady trots of fairly short duration throughout the whole period. The exercise must be varied in its form and the route changed daily. Halts and short periods of grazing are beneficial; then, of course, the rider must dismount and preferably slacken the girths. Monotony should be avoided at all costs.

Nervous and excitable horses perspire abnormally; these must be ridden carefully by good riders. This nervous perspiring weakens the horse, therefore it must be prevented. A well-behaved animal alongside may have a good effect.

The amount that a horse will perspire while at exercise depends on the humidity and temperature of the atmosphere, and, of course, on the individual temperature of the horse itself. The sweat of a healthy horse is thin, only slightly oily and dries quickly, with less liability to break out again. The sweat of an overtaxed or unhealthy horse will stand out in distinct globules on the top of the coat.

The harder a horse works the more we must try to stimulate the secretions and excretions; this is most easily and safely done by stimulating the skin secretions, by resorting to plenty of good grooming. The more work a horse does and the more hard food he gets, the more grooming and massaging should be applied. This does not mean that an idle horse should get only a little; it is necessary in this case to keep him in health, and to remove the poisons that are not excreted by sweating. It is also more difficult to keep an idle horse clean, and good grooming is essential for this.

Bandages, lined with cotton batton, can be used with advantage on the legs while exercising over very hard ground. The general use of bandages, however, is not recommended. Exercise is better when given twice a day.

Sheds and paddocks for exercising idle horses save much labour and are most beneficial.

Care should be taken when horses are regularly exercised on the sands, because the sand wears off the periople on the outside of the hoof and allows the horn to dry out too much. The feet will need to be packed with clay, etc., every few nights. (*See* Chapter IX.)

Horses should generally be exercised in a snaffle; one with a straight bar mouth-piece is excellent. It is generally better not to exercise a horse in the bridle in which he is regularly worked or hunted.

Plenty of open air exercise is essential for colts. Young horses, shut up in the stable, or even in a loose-box, will never get the chance to develop that they would if allowed to romp about most of the day in a nice pasture, or even in a yard with soft footing.

Race-horses are mostly given slow work when being prepared for races: several hours a day, with only fast work about twice a week. During non-racing periods they should not be given fast work.

It has been proved that horses that are laid off racing for a year,

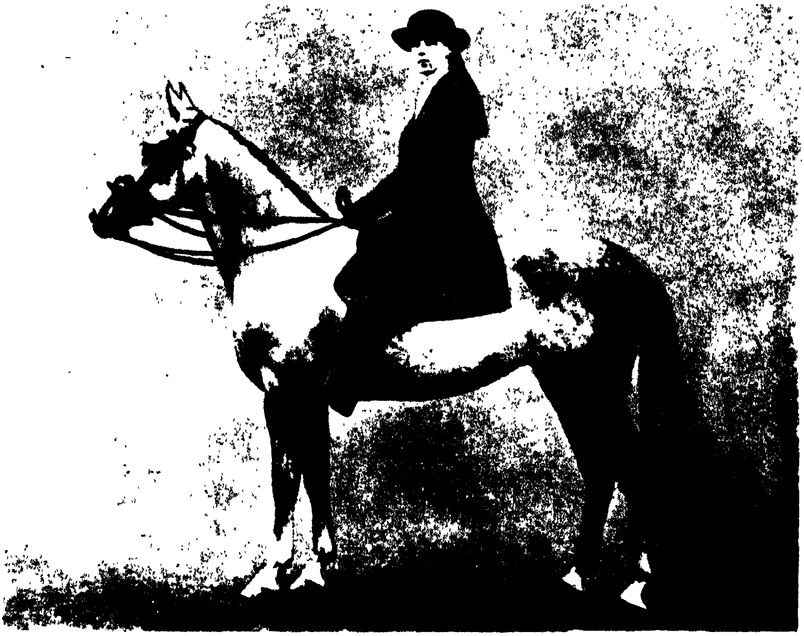
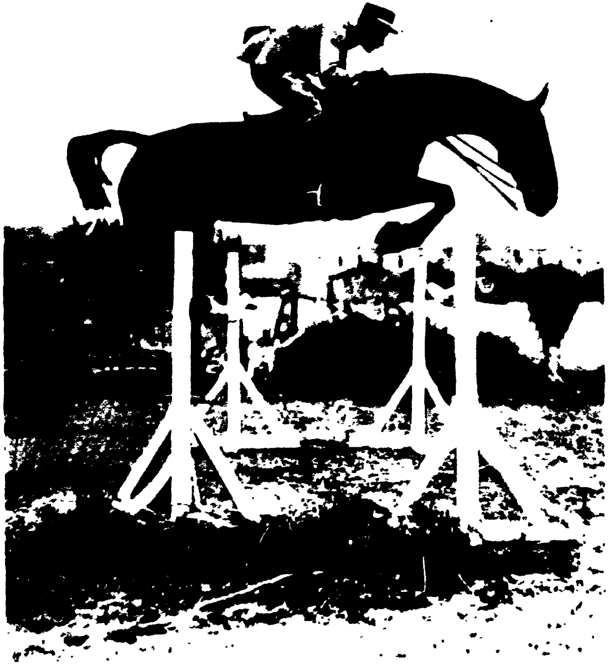


Photo: W. A. Rouch

THE LADY ASTRIDE



JUMPER : PANTIN

JUMPER : BUCEPHALUS

or more, seldom ever come back to their former speed. Some that have been raced year after year have made fine records at the age of fifteen or more. Others that have been idle for a few years and then brought back, have entirely lost their former speed.

In the past there have been some extraordinary cases of inconceivable ignorance on the subject of exercise. Take that of Melbourne, for instance, who in 1848 was never exercised except for stud duties. Nearly all his mares proved barren, and he nearly died of constipation. *Bell's Life* tells us that the following year he was taken over by a new stud-groom, given three hours' exercise a day, and got 64 out of 68 mares in foal. Rather an unusual record.

Typical routine for the training of a race-horse is as follows: turn out at 5 a.m. and exercise according to the particular work required of each horse. After which they are well dressed down, watered, fed and shut up. A young horse would get two hours' work a day, including two steady canters of four furlongs each, the rest at a walk. Feed short on hay; feed five times a day.

Slieve Gallion, in preparation for the Derby, got five to six furlong canters a day, two hours or more walking, and a gallop of one and a half miles twice a week.

Rest.—No portion of the muscular system can continue at exercise indefinitely, because the energy it loses while at work exceeds that which it receives from the blood, hence rest is essential. Even the involuntary muscles of the heart rest between each beat; the period of rest in each ventricle is about twice as long as the period of work. Rest is necessary to allow for recuperation of energy and also for the elimination of poisons. Fatigue is due to an excess of these poisons.

Breathlessness is due to the blood becoming overloaded with carbon dioxide, owing to the lungs not being able to excrete it quickly enough. The poison produced in the blood by fatigue is sarco-lactic acid ($C_3H_6O_3$), and the best means of removing this is rest and plenty of water. Horses should always be watered late at night. Half an ounce of sodium salicylate in the evening feed is a wonderful eliminator of this excess of poison. When a horse is fatigued his whole system is weakened, and his digestive powers are feeble. This must always be remembered when feeding a tired horse; a small quantity of easily-digested food is essential.

A horse will generally lie down to sleep if he is confident of his own safety; if he is not he will be on his guard. We see this exemplified in a stable where horses are abused. A horse requires three and a half hours' sleep a day at least, unless he is out at pasture.

Long-Distance Rides.—The first long-distance rides introduced served no useful purpose, unless as demonstrations of brutality they provided a lesson to others. Modern endurance tests, on the other hand, have done much good. In these rides the canter has sometimes been used partly or entirely in the place of the trot; it should not exceed nine or ten miles an hour. The canter is the natural gait of the horse. But the footing must be soft; *cantering on hard roads* is severe on the horse's legs.

I made a trip of 32 miles on hard roads on a 16.1 Thoroughbred in summer. He had been having ten to twelve miles a day exercise at the walk and steady trot for some months, and fed on 10 lb. of oats and 15 lb. of hay per diem, with a few carrots, and a bundle of green feed in lieu of some of the hay. The trip out of 16 miles, was as follows: 5 minutes walk, 10 minutes trot, 5 minutes walk, 10 minutes trot, a mile canter on side of road, 7 minutes walk, 11 minutes trot, 5 minutes halt (dismounted and fed grass), 2 minutes led at walk, 10 minutes trot, 5 minutes walk, 15 minutes trot (walked down two hills, led down one of them), 5 minutes walk, 15 minutes trot, 5 minutes walk, 5 minutes trot, 5 minutes walk. Arrived at destination quite cool; watered and fed hay. After half an hour, fed one gallon oats with two handfuls of chaff. Started back three-quarters of an hour after horse had finished his grain. Two and a quarter hours going the 16 miles. The rate on the way out was about 8 miles an hour and about 7 coming back. The horse was in perfect condition next day. (*See* Care of Horses on the Road, page 68.)

Medium or long-distance rides, as distinct from long-distance races, teach us how to regulate the pace, take care of one's horse and oneself, and judge distance and time.

Most of the long-distance rides that are held now consist of riding a horse for five consecutive days over a distance of 60 miles each day. A minimum time is laid down; no horse is allowed to finish each day's distance in less than this time. Condition on arrival counts very high.

Recently, in Colorado, a five-day 300-mile test was held. The weight carried was 200 lb. Any breed. Some of the horses had been consistently trained, others were brought from ordinary hard work on the ranches. The ride was supervised by practical horsemen, veterinarians and humane officers. Only horses with straight action were allowed to start. Soundness, stamina and weight-carrying ability, within reasonable limits of speed and general condition were the points on which marks were allotted. Only three of the starters finished without any lameness. The judges declared that breeders did not fully realize the value of straight action. Defective action causes self-inflicted injury when the horse is tired. A Thoroughbred won this test, with a Morgan second and a half-bred cow-pony third.

The Arab Horse Society of Great Britain has held some very successful endurance tests of 300 miles to be covered in five days. The pure-bred Arabian Shahzade covered the distance in 37 hours 29 minutes, actual time on the road (doing 60 miles each day). This is an average speed of eight miles an hour. Emphasis was laid on the absence of cruelty, which would be entirely antagonistic to the interests of the test. No whip or spurs were allowed and there were no signs of punishment. Shahzade stands 15 hands and weighed only 812 lb.

All the Arabians at the end of the race looked as if they had only been out on daily exercise, so fit were they when they were put to the test and so well were they ridden. The winning horse lost only 7 lb.

Other endurance tests of note, which have been made in the last few years, are:

Fort Ethan Allen, Vermont, to Camp Devens, Mass., 306 miles in five days, won by Arabian mare Ramla, 14.3 hands, 850 lb. weight. Time on road, 51½ hours, carrying 200 lb. Season of year, October.

The same distance, another year, won by a half-bred mare, Mlle. Denise, 15.2½ hands, 980 lb. Time 46 hours 57 minutes.

A test of 310 miles in five days from New Jersey State to Washington, D.C., carrying 245 lb., won by Arabian gelding Crabbet, 15.2 hands, 925 lb. Time, 49 hours 4 minutes.

A test of 300 miles in five days in the New England States, won by Thoroughbred mare Vendetta, 15.2½ hands. 1012 lb., carrying 225 lb. Time, 45 hours 7 minutes.

A test in New York State of 300 miles in five days, won by Anglo-Arab Gonya, 15.3½ hands, 983 lb., carrying 225 lb. Time, 45 hours on the road.

Mr. George Bell, a New Zealand farmer, a few years ago, made the journey from York to London in 84 hours, and the return trip to York in 81 hours, riding a Yorkshire hunter, Yorkshire Boy.

The horse was inspected at all the halts on the route by R.S.P.C.A. inspectors and always found to be in perfect condition, in spite of the fact that a heavy rainstorm was ridden through; and on one day 23 miles was covered on tarred macadam road in a heavy snowstorm, with several inches of snow on the ground.

Lending Horses.—Lending horses is all very well in the case of an owner who takes little interest in his animals, and cares little how they are spoilt. But with the careful owner, who has his horses well schooled and cared for, it is a risky procedure, unless he knows he is loaning to a capable horseman who will take as good care and give as good a ride as he does himself. People should know better than to borrow horses. It is quite another matter to be offered a horse on loan. Shakespeare tells us: "Loan oft loses both itself and friend; and borrowing dulls the edge of husbandry." The wise horseman would rather hire a horse for a friend whose horsemanship was in doubt. One ride on a good horse by a bad rider may do harm that it will take weeks, or even longer, to undo.

Care of Horses on the Road.—Hacks, hunters, carriage horses, army horses, commercial horses, farm horses and every other type are included in this section.

There are numbers of men handling horses who should never be allowed to touch them. The *Buffalo Horse World* reminded us lately: "They yell at their horses, strike them, swear at them, and otherwise abuse them. Gentleness, kindness and quietness are prime requisites in a driver if he would get the most out of his horses."

Before a horse is given a long march or trip he must be in condition. Cavalry horses on the march walk at four miles an hour, and trot at eight. The average rate of a march, combined walk and trot, including short halts, is five miles an hour.

The rate of the canter is eight to nine miles an hour, gallop, twelve to fifteen, and up to twenty or more for the extended gallop. Twenty to twenty-five miles a day is a fair distance for a horse; with a good load this is too much. Horses should be allowed to go their own pace and not be continually worried to go faster or continually checked by slower moving bodies in front. Conformity of pace is essential if horses are to be kept in condition. With riding-horses, lolling about in the saddle must never be allowed; a tired horse, if led for a few hours, will recuperate wonderfully. This also refreshes the rider.

Before a long trip is made, great care must be taken to ascertain that all saddlery, harness and bridles fit properly and are scrupulously clean inside. That the horses have no galls or other ailments; that they are feeding and drinking normally and have a bright eye and glossy coat. Their shoes must be carefully examined, to see that there are no nails missing, that the shoe is on correctly, and not worn too much. An ordinary mild-steel shoe on macadam roads should last for 200 to 300 miles. Horses that twist their hind feet in action may wear out a shoe in 150 miles.

Riding-horses must be allowed to move on the side of the road whenever possible. The horse should be led down all steep hills and up most of them. A rider should walk and lead for ten minutes in every hour on a long ride. Soft ground should never be overlooked. Halts must be made frequently: for five or ten minutes every hour. A short halt should be made fifteen minutes after starting to check up girths, saddles and harness. At every halt the rider should dismount and loosen the girths. Every opportunity should be taken to let the horse drink or graze, remembering that the horse has a small stomach.

At every halt the feet and shoes must be examined; stones, nails, etc., must be looked for in the feet, and any irregularity in the shoes or nails. Dust should be avoided if possible. In bad dust horses must not be kept too close together, so as to avoid their inhaling too much of the dust.

Bits must be removed if horses are given a regular drink or fed hay or grain. Public water-troughs, except those that flow freely and are quite clean, should be avoided. A canvas water-bucket can be carried and filled from the tap. On active service a chance of watering or feeding must never be lost. Feed often and in small quantities. Do not feed from the nosebag by time, but by quantity; a slow eater will starve if he is fed by "time."

Hay-nets, that hold 30 lb. when well packed, are the best means of carrying hay and of feeding it outside the stable. Compressed rations have been used on very long treks, but they should not be used normally, as the bulk furnished by hay, etc., is essential to keep a horse fit.

Horses can be fed grain from a box, or in the case of a saddle-horse, from a nosebag. The nosebag must be adjusted properly; it must not be buckled up too high at first, but raised as the contents are consumed. A box or log to rest the nosebag on is beneficial. The mouth of the nosebag should not be tight, as there must be ventilation for the horse to breathe comfortably.

Cavalry horses can be cooled down quickly on hot days when returning home, if ridden in column of sections, extended with intervals. In crossing a field or common, each section can extend to ten yards' interval. There is a tendency for young and old riders to be too severe with their horses early in the day and to keep no reserve for when the occasion demands. Everything should be done to keep up a horse's spirits on a long trip. In making long treks I used to whistle and sing; it seemed to cheer the horse! The horse likes company and being spoken to.

In very hot weather the best preventive against foot trouble (laminitis) is to sweat the horse a little; this prevents congestion of the feet.

When a horse returns from a long trip, as little time as possible must be lost in getting to work on him. A good horseman never thinks of himself until he has cared for his horse. This is an essential attribute in every good horseman. Those in charge of horses on a trip must remember, "What is not inspected is neglected." A lazy man is no good to have charge of horses. Girths must be loosened, harness removed and the legs rubbed down. This increases the circulation in the legs, which is naturally weaker, so far away from the heart. The legs should be massaged against the coat, in the direction of the blood-flow in the veins. When the saddle or harness is removed, the back also must be well rubbed. (*See* Chapter V.)

It is essential thoroughly to groom a horse after work; it is then that grooming does the most good. But if a horse is very fatigued he should be quickly rubbed down and dried if necessary, and left in peace to eat a hot mash. A saddle should never be taken off directly the rider dismounts, for we must allow the emptied blood-vessels to fill slowly, otherwise they will become ruptured and produce lumps on the back. Do not ride with stirrups too long—it tires the horse.

Every care should be taken to economize horseflesh, and only when a crisis arises should the horse be given abnormal work. Because a man is a good rider, it does not follow that he is a good horsemaster. Horsemastership is a rare art and should be studied much closer by every horse-owner and attendant. In no case is it so important as with a cavalry leader on active service, the whole efficiency of his arm depending on his knowledge of horse management. The appalling horse casualties due to debility, sore backs and other causes in the South African War compared with the extraordinarily few in the Great War, after the Horsemastership Department was introduced, are sufficient proof of the importance of this subject. A horse is not a machine, and nature imposes very clear limits on its powers which, if exceeded, will gravely endanger its use.

The best way to encourage soldiers to look well after their mounts is to let each man have his own horse—no one should be allowed to take a good horse away from a man, unless the latter is abusing the horse or is unsuited to it. Little prizes should be given for the best-cared-for horses.

Grooms must be encouraged by being praised for good work, and reprimanded for bad. A feeling of proprietorship should be inculcated in any man who has care of a horse. Nothing more rapidly destroys this most essential spirit than the feeling that horses can easily be replaced.

Horses rapidly become acclimatized to cold, but it is essential, if it is possible, to get a horse gradually used to exposure. Horses cannot stand heat in the same way. The sun has a very bad effect on many of them. and every endeavour must be made to keep them from excessive exposure to sun and heat. Plenty of water must be given and cool stabling used at night. In a hot sun the poll (in between the ears) should be protected. Rest and cool environment are essential for a horse suffering from heat. (*See* Chapter XI.)

On the march every opportunity must be taken to relieve pack animals of the loads. These should be removed from the saddle, and the girths loosened at every halt of fifteen minutes or longer. The maximum weight for a mule, or pack-horse, including the saddle, should not exceed 200lb. Dead-weight is much more severe on a horse or mule than live weight. Generally, one pound of the former is equivalent to two of the latter when the horse is at the trot. No part of the pack must touch the horse. The weight must be evenly distributed. A mule may show signs of pain by twitching its lips, or of fatigue by drooping its ears. Mules are not stupid as is so often supposed by those who know nothing about them. They are quite intelligent and extraordinarily willing, and very much appreciate decent treatment.

Horses in Camp.—On active service, or during the nightly halts when on a long trek, horses should be put in billets whenever possible; by this is meant any form of stable or shed, as opposed to the open bivouac or camp. The billet gives extra comfort to the horse, lessens the chance of kicks, etc., and gives less work to the man in charge. If the horse is to be picketed in the open he must be secured in such a way that he will not get injured. His hind- and fore-feet should be on the same level. In choosing a site, protection from mud should be the first consideration; then from wind and then from rain. Whenever possible a breast-line (about four feet off the ground) should be used. If many horses are picketed together and they are not properly mated, heel shackles may have to be used to prevent kicks. The shackle must be above the fetlock. The head-rope should allow the horse to get his head right up, but no more, and the heel-rope should be just taut when the horse is standing with the head-rope taut, whether the latter is fastened to a ground-line or a breast-rope. The shackle must be of well-dubbed leather, with the buckle put on the outside of the leg, tight enough to prevent it slipping below the fetlock, and so injuring the heel. (*See* Fig. 8, page 98.)

If space admits, each horse should be fastened with a short head-rope to a swivel-ring on the top of a separate four-foot post. He should not be tied to a tree, as he will eat the bark and so kill the tree, and he will probably get himself caught up by circling round the trunk.

Mares that are in season should be separated, and great pains taken to mate horses; putting those together that will keep quiet.

The sanitation of a camping-ground requires special consideration; a gentle slope will facilitate drainage. Ground that would become flooded in event of rain should be avoided. Manure should be removed at once and taken a considerable distance away, as it attracts flies. Flies lay eggs on fresh manure, which take about twenty-four hours to hatch out. Manure, therefore, should be packed in heaps and a thin layer of earth put over the top, with a ditch cut around the bottom of the heap. The heat generated by the stacked manure will kill the eggs by setting the albumen. A little chloride of lime or kerosene oil should be put into the ditch, so that should any maggots hatch out they will get into it as they crawl down under the earth covering. Chloride of lime and kerosene oil sprinkled around will assist to keep flies away.

Fly-sheets, or nets, should be used whenever flies are troublesome. If the camp is to stand for long it may be necessary, in bad weather, to make brick or cinder standings. It is better to have horses in the open than under a draughty roof.

In windy weather, hay or green feed should be fed in hay-nets. These are best used at all times, hung to the breast-line; one to every two horses will suffice; but a greedy feeder must not be paired with a slow feeder. The hay-nets should be kept in good order. They rot very quickly if not dried out. Nosebags should be turned inside-out daily to air, and scrubbed once a week. Each horse must have his own, marked. The horses should not be allowed to eat sand or their droppings. A capricious appetite generally means lack of bulk in the food. If there is a prevailing wind the horses should be stood with their tails to the wind. A space of at least five feet in width must be allowed for each horse. In the cold early morning the legs should be hand rubbed, the ears pulled gently to warm the horse and increase his circulation.

Hobbles and Knee-halter.—Sometimes it is necessary to hobble a horse while grazing, especially where there are no fences. The best hobbles are of leather, with rings for the short length of rope. Both fore-legs, or a fore- and hind-leg, may be hobbled together, sufficiently close to prevent trotting, and yet allow the horse to walk. Such hobbles are put on above the fetlocks. Knee-haltering may also be used; the head-rope attached to the jowl-ring of the head-collar is passed three times around the leg above the knee and not too tightly tied, of such a length as to prevent the horse getting his head up sufficiently to trot. These restrictions must never be left on a horse for more than a few hours at a time.

Transport by Rail and Sea.—Before a horse is sent on a long journey, at the end of which hard work is required of him, he must be entirely fit before embarking. Horses in good condition will keep fit on a long sea or train voyage, whilst those in soft condition often succumb to shipping fever. When I crossed the Atlantic in 1914 with 620 of our horses, we were twenty days on board and did not lose any of our trained horses, or even of those that we had had for six weeks after mobilizing to war strength; our only losses were among those taken over a few days before embarking, on account of the soft condition they were in.

Horses must be prepared for a week before going on a long voyage, by being given boiled feed at night and reduced grain rations. Their bowels must be open and kept so while on board. Very few oats should be fed on board ship on a voyage of over a few days; the main diet should be bran mashes and plenty of good hay. Water should be given freely. The addition of four ounces of vinegar per horse in the water every other day has a good effect in preventing sea-sickness. A horse cannot vomit but he can be quite sick. Before going on a boat or train on a trip of only a day or two the horse should be watered and fed grain. If, however, he is to be slung on board, he should not be watered first.

The practice of inoculating horses before being shipped by boat or train has been found most beneficial in preventing shipping fever. This consists in inoculating a sterile culture of equine streptococci.

Plenty of carrots, or other roots, and rock salt must be given on board ship. Two pounds of oats a day should be ample; these are better fed crushed.

In loading, the old horses should be led on first; young ones will generally follow without any fuss. If they will not, then it is almost certain that they have been ill-used on a former occasion. I never have any trouble with horses that have not been mishandled by bad horsemen. A horse must never be forced aboard, shouted at or whipped. Such practices are only too common and show absolute lack of horse-sense. Any hesitation at entering the train or ship is due to timidity, and any form of roughness will only increase fear. For an old horse that is a bit stubborn a rope can be passed around the hind-legs below the buttocks and pulled by a man on each side, or the men can lock their hands together and hold their arms in the place of the rope. Never pull at the horse's head, nor stand in front of him and stare at him. Make the footing safe; if slippery, put down sand or cinders. If the horse is nervous and starts to fight, do not on any account fight him; take a little time, get everybody else away and have a nosebag with some oats in and coax the horse in. If time is not of very great importance, we must, at all costs, associate entering the train with pleasant sensations.

The stalls, floors and all parts should be thoroughly examined for nails or other protruding objects that might injure the horse. Have a good bedding on the floor and never allow smoking or lighted matches. Keep a bucket of water at hand in case of fire. Sand, ashes or litter must be spread in passages and stalls, to prevent slipping.

Harness and saddlery should be stored in separate places, except on journeys of only a few hours, when harness and saddlery are sometimes left on, but in that case. girths must be loosened. Generally speaking, horses should be rugged and their legs bandaged with cotton-wool bandages. The tail should be protected from rubbing. Tail-guards, kept in position with a crupper attached to the rug, are the safest protection. Bandages must never be tight or damage will result; they can only be kept on by plaiting several locks of the tail into the bandage.

Proper sanitation must be insisted on. Exercise on board ship is most beneficial, if it can be managed. On the train, it can be arranged at lengthy halts. Ventilation is of the greatest importance; otherwise chills, fever and even pneumonia will result. Stalls and decks should be limewashed before the horses are put in.

On the train, feeding is usually done from nosebags, the hay from hay-nets, or racks made with blankets.

In railway horse-cars where attendants do not travel, it is safer not to use straw as bedding; the nosebags can be filled in the forage car and put on at a halt, and the hay-nets similarly replenished.

Horses are much better in a wide stall on board ship; one of four feet six inches in width will allow them to lie down in calm weather. When it is rough they will not try to do so. In a vessel of about 7,000 tons, in a rough sea, there is no need to sling a horse unless it is sick. The stalls must be cleaned out daily. Horses must never be put into parts of the ship which are not properly ventilated with portholes and air-shafts. The front of each stall should be movable to allow the horse out for exercise in the gangway. The stall partitions must reach to within one inch of the floor, or a horse may get his foot under the partition and break his leg.

Partitions should reach up to five feet six inches, to prevent horses biting at one another; these should not be solid throughout, but the timber should be spaced to allow for circulation of air. If a sling is used, the wide stall can be made narrow, in order to steady the horse, by inserting an extra piece of planking, two inches by six inches, along one side of the horse. During rough weather the men should stay with the horses.

On reaching their destination horses should be gradually brought back to their good condition by judicious feeding and exercise. They should not have lost much in condition if the journey has been calm and not too long. If they are in bad condition on landing, it will take several weeks, at least, to get them fit again. Steady gradation must be adopted.

On the train, horses loaded in cattle-cars should be packed in closely, as this will lessen the chance of falls and kicks. Horses are generally loaded alternately head to tail, with their heads tied up fairly short. If horses are left loose in a car their heads are generally faced away from the other railway track. Great care must be taken that all doors are properly closed and that, before being used, all gangways and ramps are safe.

The best horse-cars are the padded three-horse boxes on the English railways. Modern motor-vans are very similar.

The floors of horse-cars should be of soft wood—that being less slippery—or covered with small slats. Sawdust and shavings on hard wood are slippery. Horses are better and safer with their shoes off when travelling.

Swimming Horses.—The horse is naturally a very powerful swimmer, and can carry a man in the saddle if its mouth is not interfered with. They are often afraid to enter the water alone and should be coaxed in by other willing horses. A horse must not be driven in and made to fear the water. The rider should be able to swim, and should slip off the animal's back when in three or four feet of water. Normally, a saddle and bit should not be left on the horse; only the bridoon bit and one rein, the latter being knotted up to prevent it becoming entangled in the animal's legs.

Directly the horse strikes off, the rider should float or swim by its side and hold on to the mane just in front of the withers, or to a neck strap. The horse should not be guided by the reins, which must never be pulled or the horse may be drowned. The horse should be guided by splashing water against the neck on the side away from which he is to turn. If the horse swims well for his destination the rider should merely float by his side.

Horses may be made to cross a river by means of the endless rope; they should be tied to this rope at intervals and thereby led across the river. They may also be taken across in small groups tied to a boat. When tying a rope around a horse's neck a slip-knot should never be used. In leading horses in the water from a boat or by other methods, great care must be taken not to pull the animals' heads under the water.

If horses are driven into the water and allowed to swim freely across, other horses should be exposed on the opposite bank as a guide to the swimmers. It must be remembered that when in the water a horse cannot see very far, not much farther than a man can: he may, therefore, not be able to see the opposite bank and may begin to swim in the wrong direction. A horse will generally swim down-stream.

RIDING

ON RIDING

It is not intended in this book to give a discourse on equitation; this subject has been dealt with in detail in "Riding and Schooling." Here the subject will be touched on from the point of view of horse management

Seats.—Much has been written on the various types of seat, but now that the old straight-leg has been dispensed with as having no practical value except in the old-time heavy cavalry charge, the seat is practically the same for all riding. The length of the stirrup is altered to suit circumstances; for instance, for hunting and jumping it should be one or two holes shorter than for hacking or high school-riding; and shorter still for steeplechasing. In flat-racing it is shortened still more, so much so now that the jockey's knees are right up over the saddle; he has no real use of his legs and is unable to keep on if the horse makes a sudden turn, unless perhaps he hangs on with the reins.

The rider must sit on his own seat on the saddle and not ride on his crutch. His legs from thigh to knee must be in contact with the saddle, and the leg below the knee should be under the knee and not in continual contact with the saddle. The stirrups must be of equal length. A rider cannot acquire a good seat until he has good balance, and this latter cannot be acquired until he has confidence. Bareback riding and circus practice are the best possible means of getting perfect balance, independent of the reins.

Good hands are essential as well as a good seat. Riding too short will cramp the rider and prevent proper use of the legs, whilst riding too long will prevent a decent, natural, firm seat, and tire both rider and horse. The grip comes from the whole length of the thigh down to the knee, and if the knee is straight the inside thigh muscles are rounded, but if bent, they are flat.

The leg below the knee must be moved to apply the aids without such movement being transmitted in any way to the body. At the walk, the body should be perpendicular, hands well down and reins not too long. At the trot, the body must be inclined a little forward at each rise in the saddle, the whole pivoting over the knee as a fulcrum. At the canter, the body is held almost vertical, but at speed and in rising at a jump, it must be inclined forward. Mechanics explain why this is necessary. The rider must never lean back when rising at a jump. If he does he is dependent on the reins and the horse's mouth to keep him in position. Nor must he throw his weight back in landing over a jump; if he does, the change of position of weight must unbalance the horse and cause him to hit the jump. In steeplechasing we commonly see jockeys lean right back on landing, with the result that the horse has to overcome an extra amount of inertia as he makes his first stride after landing. The weight in this case must be well forward from take-off to landing.

On horse ranches an arm-chair type of saddle—called a stock saddle—is used, and is very useful for riding bucking broncos, and on long treks, but in it one cannot "ride" a horse, one is a passenger pure and simple. I have ridden thousands of miles and many bucking broncos in them, and well know their uses and their limitations. They are particularly suitable for the cow-pony that lopes. A saddle must allow the rider's seat to be as close to the horse's back as possible. The English hunting-saddle pattern is the only one that really allows this. (*See* Plate facing p. 65.)

To get absolute independence of the reins, one must practise considerably riding without holding them.

By far the quickest and surest way of learning to jump without depending on the reins, is not to hold them at all, or hold them by the centre buckle quite loosely. Otherwise it is very difficult not to touch the horse on the mouth, or even jerk his mouth, and probably hold on by means of the reins. This will never teach jumping and will ruin the best-natured horse. In many cases such a method of learning to jump—that is by hanging on to the reins—is downright cruelty. The cinematograph and the instantaneous camera have shown us too many horrible examples of jumping. We see these terrible exhibitions of bad riding, with lack of seat, hands and balance, every week in the sporting illustrated journals. The greatest hindrance to riders improving their hands, balance and seat, is the feeling that because they have ridden for so long, or ridden all their lives, or hunted all their lives, therefore they have nothing to learn. It is sad that the art of horsemanship is not studied as are all other arts, and yet it is the most difficult thoroughly to understand or master.

The subject of abuse of the horse's mouth while riding and jumping has been dealt with in the chapters on Psychology and Training.

Hands.—"Hands" is the power the rider or driver possesses, through the medium of his hands, of communication between himself and his horse. It is synonymous with the delicate, sympathetic touch of a good musician on the piano keys. "Good hands" mean everything to the first-class horseman. He can do almost anything with a horse that those with "bad hands" can do almost nothing. "Good hands" are a gift, although hands can be greatly improved with practice.

A rider with good hands has no difficulty in mouthing a horse properly (*see* page 48); a horse's head cannot be properly placed until he has been mouthed. His body cannot be placed and collected until his head is placed. When the horse is properly mouthed and made obedient, and has had his head and neck properly placed, he will arch his neck and bring his head to about 60° with the ground, relaxing the lower jaw, and bringing his haunches under him, and balancing himself on all four legs, as the rider's legs are closed on to his sides, the hands being "fixed" to resist forward motion. The rider must not make any action with his legs that he is not able to meet with his hands. Mechanical contrivances will never make horses. Horses, though, will make "hands": that is, the making of horses will greatly improve one's hands.

There is no comparison between riding a made horse and riding the average so-called trained horse. The use of the leg is as a delicate indicator and not as a means of kicking the horse's sides, and still less of spurring them.

Do not flap your legs or your hands; keep them still, and keep your hands down and your legs under your knees. Heavy legs and heavy hands are usually found on the same rider.

A very erroneous, but too commonly held idea, is that it is correct to ride with one hand. A good rider rides with both hands on the reins, except when he requires one for some other purpose. The beginner exposes his lack of knowledge by attempting to ride with only one hand. A young horse cannot be trained with one hand. He is trained to go with one hand at polo or on military parades after he has been trained as a saddle-horse.

Some General Hints.—Any form of stiffness or unnatural attitude should be avoided while in the saddle. It takes nine to twelve months to become a fair rider and many years to become a good one. The leg must, from the first, be turned in from the hip joint, so that the point of the knee is directed towards the saddle; but the toes must not be forced in parallel to the horse's sides; such a practice means an unnatural, forced position.

Consider your horse while you are out; avoid anything, such as pieces of wood that may have nails protruding from them, that will cause injury to him. Always examine his feet and shoes before going out and after coming in.

Remember that your feelings are transmitted to the horse; a timid rider will upset a nervous horse; a nervous rider will make a good horse refuse at a jump.

When riding over wooden bridges be careful that the flooring is not rotten, and that there are no holes through which your horse's foot might fall. A one-inch planking is not safe for a horse. A two-inch planking is the minimum thickness for safety, and that should be inspected very often.

Practise opening gates and closing them while in the saddle, and making your horse stand while you talk to a friend.

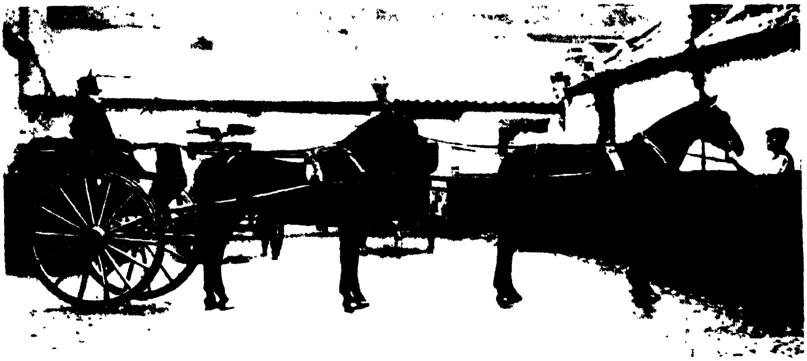
If a horse's hind-legs should slip under him, never pull the reins, but give him his head and lean forward.

When mounting a horse that will not stand still, take hold of the head-collar with your left hand and draw his head round towards you; it is then quite easy to mount, as he can only swing round on a circle of which you are the centre. When about to take your horse out for a ride, personally inspect the bit, bridle, saddle and girth. Satisfy yourself that everything is correct. Practise mounting and dismounting on both sides. Avoid monotony in your work, and do not use the closed school too much. Reining-back is a wonderful placing and suppling exercise, but this must not be overdone. A few steps slowly back, then a halt, then forward, then a few more back, and so on. Always make much of your horse after he does an act correctly.

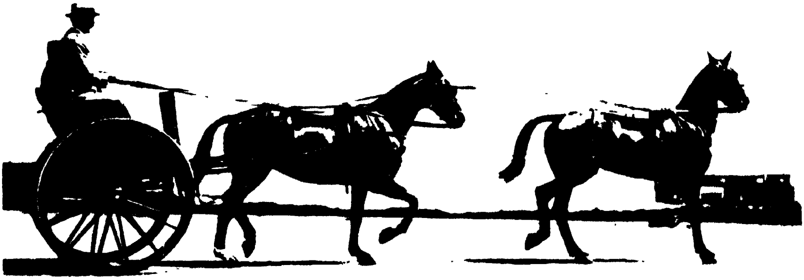
A riding instructor must be humane to the pupil as well as to the horse. No good will result if the pupil is frightened. He must be given confidence and not asked to do things that the instructor would not like to do. The pupil should be taught to blame himself rather than his horse for any failure.

It is a common thing to find young men nowadays too lazy to take the trouble to school their horses. The present age of mechanical devices and general hurry seems to kill so much of the good old spirit and painstaking that produced the sportsmen of the past. But the sooner we appreciate the value of horseback riding, and mental relaxation in training and working horses, the better for the health of the nation.

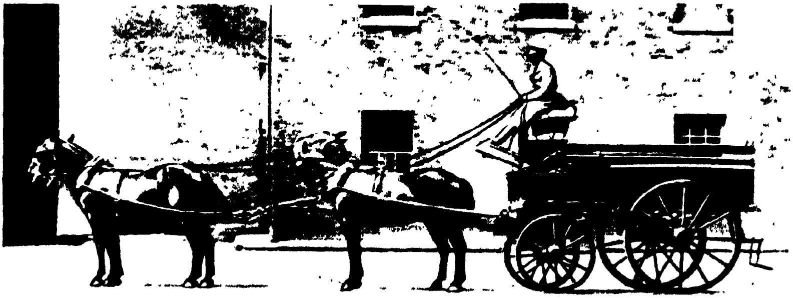
A well-known French sportsman, writing during the late war, said: "Who would have thought that England could have raised in so few months an army of a million volunteers so perfectly



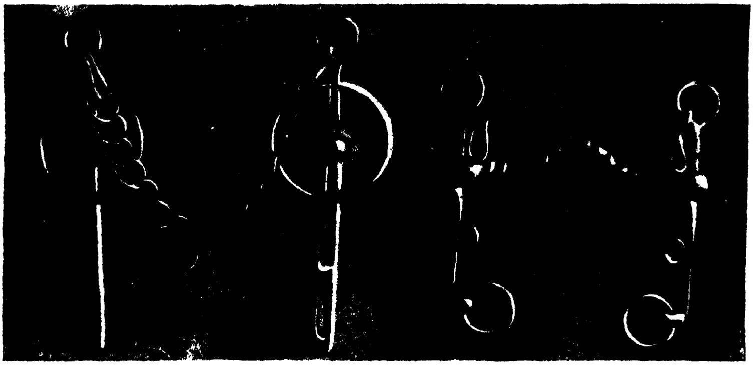
TANDEM



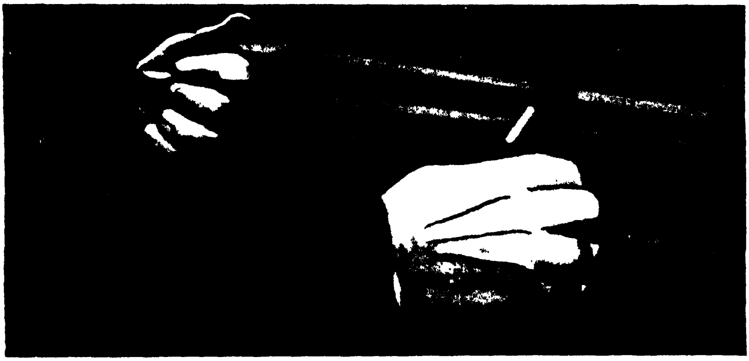
SPORTING TANDEM IN ACTION



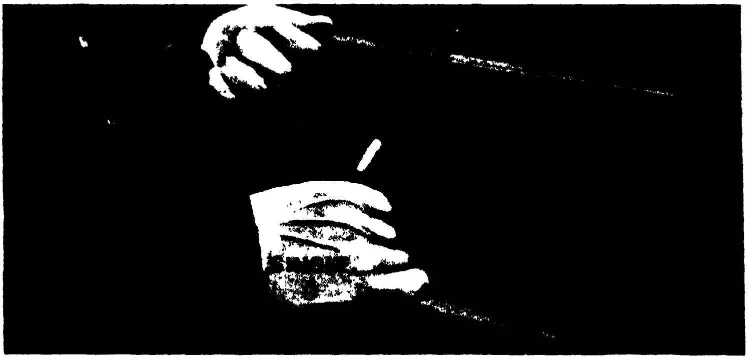
FOUR-IN-HAND



BITS



THE REINS: TANDEM OR FOUR IN HAND



THE REINS: PAIR OR SINGLE

equipped. Is not your sporting instinct at the foundation of this fighting force? In this spirit are incorporated all the grand qualities of your race, and nothing serves better to keep it up and develop it than your love of riding."

A noted savage once said that he looked upon scientists as amateurs who could neither ride nor cook!

The late Colonel Gough used to ride every morning from Brighton Barracks to Astley House, Lewes, and ride a race-horse over a three-mile course, and ride home again to breakfast. In training oneself for riding a race, one must have daily practice at a fast pace. Other forms of taking strenuous exercise will not produce the same results. Thousands of people could afford to keep a saddle-horse if they wasted less money on selfish luxuries that are more harmful than good for their health. Their improved health would make them new men.

When flies are bad, eye-fringes on the bridle will greatly help the horse, especially those with no forelocks. A fly-whisk should be carried too; one made of horsehair is the best kind.

Great lack of thought is often displayed by leaders of a column on the line of march, by riding at a pace that is too fast for the majority of the horses. This causes much distress amongst the horses and riders.

Groups of horses are sometimes linked together during a short halt. Great care must be taken that the reins of one horse are never tied to the head-collar of the next, and so on; because if the horses pulled apart some would have their jaws broken. When the reins are used, the reins from the off-side of the bit must be tied to the nearest side of the bit of the next horse, and so on. It is best to use ropes and tie from head-collar (jowl-ring) to head-collar.

Show Jumping.—Show jumping should be a means to an end, and not an end in itself. Horses used for show jumping should be used for hunting or other purposes. The show-ring is an excellent school for any hunter. The rider who limits his activities to the show-ring can never be ranked as a first-class horseman; the latter should be just as much at home hunting across any kind of country as he is when going over the Olympia course.

The horse show, so far as jumpers are concerned, is divided into classes for performers and those for hunters. In the latter, jumping contributes only a portion of the points, conformation being the important factor; the jumping, therefore, is not always of very high standard, and the riding is often far from excellent. In the performance classes we see the best of jumping and the pick of the riders from all nations, but often the horses are very little to look at.

It is most regrettable that many exhibitors and riders still use methods which are decidedly cruel in schooling their horses for the show-ring. Horse-show committees and humane societies should use every means in their power to eliminate cruel practices in such preparation and schooling. The best of horsemen do not resort to them; their horses are trained by humane, modern methods. (*See* Chapter III.) I regret that so many do not possess the natural love for horses that appears to be bred in the blood of the Briton.

Spurs and Whips.—Both these have their use in proper hands, as they were invented for a purpose; but as a rule they are abused rather than used, and in such cases would be better if dispensed with. Sharp spurs should never be used, and those with any rowels but seldom. For punishment, a whip is always superior to the spur. The whip is more humane and can be applied in the right place—behind the saddle or on the back. (*See* Punishment, page 41.) The sharp spur as a means of punishment is a terrible instrument. It is horrible to see how many would-be horsemen cover their horses' sides with blood. Many horses' tempers are ruined by the abuse of spurs.

Some riders think they are not properly dressed unless they have spurs on. Why do all saddlers sell spurs with sharp rowels? This should be rectified. There is not one horse in ten thousand that needs them, and the worst could be handled far better by a first-class horseman without them.

Whips should never be lined with steel. The sale of such should be forbidden. Whalebone or rawhide make suitable lining. A leather whip, or stick lined with rawhide, is the best thing to carry in the saddle. About 25 inches is the correct length.

In schooling horses, spurs should not be used at all until it is found that the heel is not getting the desired effects. The spur and whip are indispensable indicators in advanced training. With the rowelless spur one can feel the horse's flanks as delicately as the reins can feel the mouth; and the action of the leg and hand are so closely connected. If a sharp spur—such as was common in the days of Nolan—were used, one would get an action from the horse that would be entirely beyond the control of the hand; the horse would be temporarily out of command.

Sharp spurs ruin young horses and prevent any possibility of the proper use of the spur as an indicator. If the horse needs punishment, then the whip or blunt spur is sufficient as an instrument of reproof; but directly he is obedient he must be caressed, and the whip or spur continued to be used as an indicator. For ladies riding side-saddle, the whip, which must be stiff, is used to take the place of the leg on the off-side.

I use the word "indicator" in preference to "aid," because the latter rather implies the application of physical assistance, which the hands and legs do not apply, as a rule. If one dismounts and pushes a horse over, then he does apply an aid. Our hands and legs would have little effect on a horse if he did not acquiesce in the movements demanded of him.

Much has been said of late against the use of whip and spur in racing. All experienced horsemen well know that sharp spurs, or a sharp whip, never have won, and never will win, a race. Their use exposes ignorance of the horse. As the sharp spur is forbidden in polo, so it is hoped that the sharp whip and spur will be forbidden in racing and steeplechasing.

On Side-saddle Riding.—This subject has been discussed elsewhere. It is one that has raised much controversy. For sentimental reasons and for appearance and grace there are many points in favour of the side-saddle. Some claim also that the side-saddle gives a better grip for the rider. But from the point of view of horsemanship there is much to be said against it. Then there is the question of danger to the rider and physical damage.

On the other hand, custom and fashion cause many to condemn the riding astride by ladies. Some claim that it is not physically suitable for a lady. Yet, in the North-West, ladies never rode in any other way; and cow-girls were hard to beat in any long ride or annual round-up. I agree that some ladies do not look well riding astride: but do all men? And do all ladies look well riding side-saddle? Certainly not at the trot.

Side-saddle riding is difficult to learn, and there are comparatively few who ride in this way really well. The method would never do for show-jumping, which is proof that it cannot be the best way to ride a horse, any more than we would compete at Olympia or New York on one of Oliver Cromwell's saddles.

Astride-riding is undoubtedly more easily learned. The excellent showing of late at the big horse shows, by ladies riding in this way in open performance classes, is proof of this. Some of them are pretty hard to beat. They are light, have good hands, and much sympathy. I have never seen a side-saddle rider put up even a moderate exhibition over jumps in the show-ring. I refer chiefly to performance classes, not low hunter classes taken at a hand-gallop.

Many ladies ride crooked on the side-saddle, and cause internal injury and cramping of the limbs. It is not natural for a woman to sit with legs in one direction and body facing in another. Then again, a lady is dependent on the girths of a side-saddle, and few can mount without assistance. A fall with a side-saddle is much more dangerous to the rider. If she is run away with she has far less chance of escaping injury; and if in an accident she has difficulty in getting free of the horse.

Some state that a lady has not the grip that a man has. My experience some years ago, while assisting Professor Savigear in his school with ladies, and in the North-West, as well as in the show-ring, explodes this theory. I have seen far more men quite unsuited to the saddle.

The matter that concerns us most here though, is the number of horses that are laid up with sore backs from side-saddles. Many owners of large hunting and hacking stables have complained of the large number so affected. A lady usually sits on the near side, and therefore she must ride on the off diagonal, that is, she sinks into the saddle as the off-fore-leg comes to the ground, and rises as the near-fore comes down.

Paces.—The natural pace is the canter, a pace of three time. The gallop is an extended pace, and is of four time. The trot has become general with the advancement of the horse's domestication. In the trot a horse goes from one diagonal to the other. The walk is a similar pace to the trot, but in the former, the feet are on the ground for a much longer period; and, as in the trot, the diagonal pairs advance alternately. The jog is an intermediate pace between the walk and trot.

The pace is similar to the trot, but the lateral pairs advance alternately. In the canter and gallop a horse can lead with one side or the other. A three-gaited horse walks, trots and canters. A five-gaited horse single-foots and running-walks as well.

The single-foot (or rack, if increased in speed) is similar to the pace, except that the hind-foot of a lateral reaches the ground before the fore, and the body does not rock.

Running-walk (or fox-trot) is a slower pace; the horse walks in front and trots behind. A lope is a slow, smooth canter, common to prairie ponies.

An amble is a form of slow single-footing. At the canter or gallop a horse should always lead with the diagonal towards which he turns; otherwise he is liable to cross his legs and fall. When sitting in the saddle and the horse is leading with the near legs, one can see the off-shoulder advance a little before the near. The paces have been discussed in detail in "Riding and Schooling."

Records.—The Pacing Record was made by Dan Patch; 1 mile in 1 min. 55 sec.

The Trotting Record by Uhlan; 1 mile in 1 min. 54½ sec. at Lexington, Kentucky.

Trotting on ice: The Eel; 1 mile in 2 min. 11½ sec., on the river at Ottawa.

Two-year-old Trotting: Peter Volo; 1 mile in 2 min. 6¼ sec.

High Jump: August, 1941, Ruskin Lass and Peninsular both cleared 8 ft. 5 in., at Cairns, Queensland.

Ponies: Black Jack (Sydney, N.S.W.); 13 h. 1 in., cleared 6 ft. 6 in. The Arabian pony, Rosanda, 13 h. 3 in., cleared 6 ft. 3 in. Thumbs Up, 14 h. 1 in., cleared 7 ft. 5 in. in height, and 33 ft. over water.

Conformation of Saddle-Horse.—It is most important that a saddle-horse should go well at the walk, trot and canter. His action must be straight and free. The limbs must not toe in or out. His feet must be in pairs and of good size, with sound horn, good open frog, sole and bars, and be carried well off the ground and placed flat on the ground, the heels touching first. He must be impetuous and bold, and free from nervousness. His eyes must be good and appear full and kind. A long rein and neck, with a well-set-on head. Shoulders long and oblique, withers prominent and not too muscular at the sides. Back and loins strong and short, croup of good length. Well ribbed up. Barrel round, deep chest. Long forearm, broad knee and good measurement below the knee and hock. Hock well let down. Back-tendons distinct, cannon-bones short, pastern fairly long and at an angle of 45°. The girth of a good hunter should be 72 in., and the "bone" below the knee 8 in. A hunter must be particularly strong in the hocks and loins.

On Driving.—What a difference there is between a horseman driving a horse and a man who is a poor horseman, who seems to have no horse-sense and no understanding of the horse's psychology. The latter type of driver is unfortunately only too common but not so much so in countries where British blood predominates. A horseman handles his horse or his team quietly; there is sympathy in the use of his hands. The horses are frightened at a train; he has a sympathetic feeling on the reins, he does not yell at them, and immediately they behave better and move on as if they know all is well. On the other hand the poor horseman lugs on to the reins, his hands are bad and his temper and manner worse, the horses get frightened; he yells at them, forgetting their hearing is better than his own, and what a scene there is! What a difference, and yet how common is this latter scene. Xenophon told us, centuries before the Christian era, that horses were taught and managed by gentleness and not by harshness.

A very common fault is the use of the whip and the continued pulling of the reins when the horse is doing his best. Many drivers always want to go faster, whatever the pace of the horse may be. It is well to think that many of these poor drivers will soon be driving motor-cars. There is no comparison between the pleasure of driving a good horse and a motor-car, but one can never really appreciate driving the former unless one has a genuine love for horses. There is no companionship and no sympathy in driving a mechanical vehicle. It requires far greater skill to drive a horse properly, and takes longer to learn. Expert whips, of course, are few and far between. Excellent hands, perfect control over temper, great sympathy, much knowledge of the horse's powers and intelligence, knowledge of the manner of accustoming the horse to objects that he is afraid of, the use of the whip and a long experience in driving are necessary attributes.

A horse should not be worked with a rug on under the harness. Delivery horses left standing about in cold weather can be rugged, provided the rug is well buckled on and the horse does no fast work.

A horse should never be hurried unless it is necessary. A few minutes gained may mean much loss in other ways. Horses should not be trotted down hills, and brakes should be used on all heavy vehicles. A horse should be allowed to take his time going up hills, and allowed brief periods of rest when they are steep. His head must never be checked up, but allowed down so that he can put his full weight into the collar. (*See* page 131.) Trotting downhill with a load and no brakes ruins a horse's fore-legs.

No opportunity should be lost to water. In very hot weather occasional drinks of oatmeal-water should be given. Many cities supply this for hard-working horses. A horse must never be hurried while drinking, and never be trotted straight away from the trough, but allowed to walk for a few hundred yards. Nor should he be watered when winded. A horse should be allowed to get his wind when blown by being given repeated walks when on a long journey. Drivers must watch their horses to see if they are at all blown.

A common practice is to see the driver of some types of vehicles urge the horse on by kicking his toe against the horse's buttocks. This must not be done.

The horse often does not understand what is required of him, and gets thrashed, when the fault really lies with the driver. Heavy draught horses should not be trotted; it ruins their legs and is responsible for many cases of sidebone.

If a horse is frightened and moves away from the place where he was left standing, shouting at him will make him worse. It will probably make him run away. He is not deaf, so a quiet, reassuring voice of the driver that he knows will soon quieten him.

A horse's speed must never be accelerated by jerking the reins. The voice, or a light touch of the whip, are the means for urging a horse to go faster.

When he shies, care must be taken not to force his head towards the object he fears by a strong pulling of the inner rein. If it is possible to keep him going straight, the outer rein should be felt slightly the stronger. In the saddle this is simple. He must not be given the idea that he is being forced on to the object.

In cold weather, when left standing, a horse must be blanketed; and when brought in he must be well rubbed down, his feet picked out, and shoes examined. His legs and body must be examined for injuries and harness galls. He must be watered and fed before the driver attends to his own wants. The driver must take a personal pride in his horse. A horse looks fit and happy in the hands of a good horseman who is fond of his horses. If drivers had to purchase their own horses they would take better care of them. A driver should repeatedly put himself, figuratively speaking, in his horse's place.

Always watch the traces; when going down a hill apply the brakes as soon as the traces slacken, and do not release the brakes until the traces are felt again. Taking the brakes off too soon may throw a careless horse on to his knees.

And as our Spanish friends would say: "*Caballo que vuela, no quiere espuela.*"

Whips.—The best type of driving-whip for pleasure driving is the English holly whip with long lash. For commercial use, a short stock with a medium lash is cheaper and more serviceable. Holly whips are very easily broken. The chief use of the whip is as an indicator and not a means of punishment. Abuse of the whip makes a horse become callous to it, and shows very bad horsemanship. To encourage a horse to increase his speed he should have the lash drawn gently over his loins; to soothe a frightened horse, the lash should be rested on his loins and the voice used. For punishment, the lash is brought down on the loins and drawn away after it has hit the horse, not before. The whip must never be used under the belly, between the hind-legs or over the head or neck.

The lash on a tandem whip should be twelve feet long, and that on a four-in-hand whip fourteen feet.

Holding the Reins in Driving.—The plate facing p. 81 shows the method of holding the reins for single or pair, and for tandem or four-in-hand. Pleasure horses are normally driven up to the bit all, or most of, the time, the driver all the while feeling his horse's mouth. This would not be practicable with most commercial horses. But the driver of a commercial vehicle must be careful that the horse does not get into a slovenly way of going along.

In driving a pair or team of four, care must be taken that the inner or cross reins are of the correct length, so that the horses' heads are kept straight. If the off-horse in a pair requires a longer rein, then the buckle on the near-rein must be slipped farther down (towards the horses) and vice versa.

Hints on Tandem and Four-in-hand Driving.—Watch the traces carefully and keep them in equal draught. A leader should be taught to go forward or accelerate on a chirrup or click from the driver. The use of the long driving-whip for this purpose must also be taught. In a team, the steadiest and most trustworthy horse should be the near-wheeler. The driver must sit high up, so that he is well above his horses. The wheelers must always be allowed to start a vehicle and to turn it. If the leaders do this, they may break the traces or pull the wheelers over; and in the case of a tandem, the leader may turn right round when he finds the vehicle does not move. The wheelers, of course, must stop the vehicle.

Three or four feet must be allowed between the wheeler's nose and the leader's tail, depending on the height of the action of the wheeler. (Plate facing p. 80.)

The horses must be started away very steadily; the speed increased gradually. To start a team off in a hurry is bad driving. The lash of the whip is normally kept twisted around the stock and only untwisted when required on the leader.

To shorten one rein, it is pulled with the right hand behind the left hand (towards the body), the fingers of the left hand being eased to let it slip through. To ease one rein, the right hand grasps it in front of the left hand. The first and second fingers, or the first finger and thumb of the right hand, are used for this. The whip is held about six inches from the butt, well in the palm of the right hand, which allows full use of the thumb and fingers at all times. When the right hand takes up the off-reins, the leader's rein is held between the second and third fingers and the wheeler's between the third and fourth. Or, the leader's between the third and fourth, and the wheeler's outside the little or fourth finger.

To "ease" the leader means to feel his reins stronger and ease his traces, and check his pace. The leader must always be eased when going downhill, when turning a sharp turn, and when pulling up. Along the level he should not be given full rein, but when going uphill, allowed to put his full weight into the collar. Easing a horse and letting him out must be done gradually and never in jerks. If it is desired to tighten the traces of the wheeler, the leader can be eased or the wheeler accelerated, and vice versa. An eye should be kept on all the traces all the time. When making a turn, the wheeler's head should follow the leader. In making a very sharp turn or a turn about, the leader is eased right back and turned, then the wheeler is made to turn the vehicle. A loose outer rein must never be used; the outer rein must always support the inner.

If the leader should start to buck or kick, on no account tighten his reins so as to loosen his traces, because he will then probably get his hind-legs over them. If the traces are loose, he must be urged on and made to tighten them. Commonly, one sees the driver ease the leader and cause him to get tangled up in the traces.

The heavier horse should be behind. If the leader is slightly taller it assists the line of draught. (*See* Chapter V.) If the leader and wheeler are not in a straight line, then, by lengthening or shortening the two reins that are held between the first and second fingers of the left hand (Plate facing p. 81), this is rectified.

Teaching the Horse to allow Rein to be placed under Tail.—Sometimes we find that a horse is apt to try to grab the reins with his tail. This is very rare on the American Continent, where practically all driving horses have long tails. The habit is caused by bad handling in early training or in after-life: generally through the driver's heavy hands. The horse's mouth becoming sore, he uses what Nature gave him as a weapon of self-defence to ease his aching mouth. We cannot blame him for this. Drivers should use more sense themselves. Other drivers worry a horse by continually jerking at the mouth; such people cannot conceive that any bad habit contracted by the horse is caused by their own fault.

There are also other times when a horse while swishing at a fly may get his tail over the reins if they are left loose over the hind-quarters. Horses that are not used to this must be, and can be, made accustomed to it in a few lessons with a little care; and then it will not matter if they do inadvertently get their tail over the rein. The method that I always adopt with any horse, even saddle-horses when using the long reins, is to teach them to take no notice of the rein being under the tail, so much so, that they will allow one to pull the rein out without any effort, by not in any way attempting to depress the tail. This is done, as in teaching everything else, by letting the horse know that he will not be hurt by having the rein under and allowing it to be pulled out. By starting off each day for a few days with the rein under the tail, and after a while pulling it out, the horse will soon take no notice of it and, should he get his tail over when the flies are bad, one can pull the rein out quite easily. I used to keep on putting the tail over and keeping it there for some time, and the horse soon stopped depressing his tail.

The horse that is not accustomed to the feel of the rein under the tail may object on his first experience, and depress the tail in self-defence. The inexperienced driver then pulls at the rein, and the horse holds it tighter. Were the driver to ease the rein, the horse, in all probability, would soon elevate his tail a little, as is natural when in motion. A horse will very soon release the rein himself in very many cases. Or the driver may, by touching the hind-quarters with the end of the lash, make the horse swish round at the tickling sensation. If, however, the horse appears really to be frightened, the driver should lean forward, speak gently to him, and quietly lift the tail over the rein.

But I do not consider a horse trained to harness that has not been made accustomed to the rein under the tail; it is one of the easiest things to teach a horse. It is just as essential as it is to teach him to pass a motor-car quietly, or any other necessary part of his training. (*See* page 38.) Any horse so trained can be used with perfect safety as leader in tandem or four-in-hand and is far safer than a docked horse, that usually strongly objects to a rein getting under the tail.

Horses that have had their tails mutilated and seared with a red-hot iron are generally very timid about having them handled, whilst undocked horses, properly handled, are never so. I have used this method on several nervous mares, which, it was alleged could not be so driven, and found them absolutely submissive in three or four days.

Overloading.—Overloading is too shamefully common, although the excellent work of the R.S.P.C.A. and the police has done much to reduce this. There is still a good deal to be done in the direction of over-driving. Unfortunately, people who overload horses often underfeed them. A firm that feeds its horses well does not overload them. This is commercial economy, besides being humane. The law is much too lenient with the man who underfeeds, overloads and beats his horse.

Type of Harness-horses.—The harness-horse should possess most of the good points necessary for the saddle-horse. But the good length of neck, the oblique shoulder, and the strong hock, are not a necessity in the harness-horse.

With very light vehicles, such as the American buggy, the well-bred, lightly-built horse, either Thoroughbred or Standardbred type, is very suitable. With the heavier English vehicles the cobby, thick-set type is more suitable. The feet must be large and sound; and fair length of body is a useful attribute for fast trotting. I think the common fault of many English vehicles is their excessive weight. Light vehicles are much easier on the horse's legs. On the other hand, American light vehicles never have brakes, which, in a hilly country, save the horse considerably.

THE TREATMENT OF BAD HABITS

A horse that has been in incompetent hands may have acquired very bad habits. The principle of treatment in all cases is to associate in the horse's mind unpleasant sensations while he is displaying objectionable habits and pleasant ones directly he ceases. This does not mean he is to be ill-used, because this will make him worse. (*See* Chapter II.) Great patience and firmness are necessary.

Refusers.—If a horse refuses to jump, it is most probable that he has been jerked in the mouth or cruelly treated, such as being rapped on the legs with a heavy bar, or frightened and thus made to fear a jump. Practically all refusers are made by bad handling, and they can all be cured in time by good handling. If the horse runs out, prevent him so doing by riding him properly and half the trouble is over. Excessive jumping and jumping too high may easily cause refusing. Lameness, soreness, tight shoes or weariness may cause it. Remove the cause first of all. The saddle or the bit may not fit. The mouth may be sore. Weak riding, or not "riding" the horse all the way to the jump, causes many refusals. The horse must be made to understand he is not going to be ill-used, and quietly and firmly made to jump. Whips and spurs generally do more harm than good. As soon as he has jumped he must be given a tit-bit. Faulty eyesight and lack of courage cause refusals.

Balking or Jibbing.—This is generally caused by overloading, or getting the horse sulky by bad treatment. Discover the cause, if possible, and remove it. If in the saddle or halter, turn him round and rein him back. Try tapping him lightly behind, but do not beat him; it will never cure. The horse may lack confidence in his rider or driver. Do not get the horse excited. If in a vehicle, start it moving by turning the wheels. The horse may object to the collar, it may be tight; or if a breast-collar, he may not be used to it. Never hit him the moment he starts, nor pull on his mouth. Commonly he is hit when he moves and, therefore, thinks he is being hit for moving. Balking horses are generally made by bad horsemen. Lighting a piece of paper under an inveterate jibber has been successful, but I have never found it necessary. Putting on a big crupper under the tail and fastening reins to this, and then through the bit-rings and back to the driver, has also been used with success.

Kicking.—When in the saddle the rider must prevent kicking by checking the horse on the mouth; it is the one occasion when a horse should be checked there. If a horse can be struck under the belly while in the act of kicking, a cure will generally result. In harness, a kicking-strap is often advisable from the first, to prevent the horse discovering that he can raise his hind-quarters. When he finds he cannot he will cease to attempt it. Kindness and strictness will soon stop a horse from kicking. Bad handling is responsible for most kickers.

Rearing.—This is an unpleasant habit. When the horse goes up, his head must be left absolutely free and the rider's weight thrown well forward on the neck. On no account must the reins be pulled, as is so commonly done and is the cause of most horses coming over. If the horse feels as if he is coming over, lean the weight a little to the near side of the neck and quit the off-stirrup for safety. Do not get off. If he comes over, it is quite easy to jump on your feet clear and maintain the hold of the reins. Try and keep the horse moving forwards. Do not hit him over the head.

In the case of a very obstinate horse that has had its own way for a long while, a sharp crack over the top of the bridle with a broad leather kosh that makes a deal of noise may bring him down suddenly, and cure him. Handling a horse of this type requires a deal of tact and self-control. But it can be cured, and without cruelty. I cured a horse that continually went right up by taking her on to a soft sandy spot and pulling her over. She never went up again. I let her think she had gone over herself, by doing it very quietly and appearing perfectly good tempered with her. A good smack on the ears with the open hand may serve the purpose in some cases.

Pulling.—A horse pulls from different causes: want of work, pain, excitability, fear, a bad mouth, and bad hands on the part of the rider or driver. If it is from want of work, give him more. The lunging-rein is an excellent means of getting rid of superfluous energy, and the feed may need regulating. It must be remembered however, that it takes two to pull. Good hands are always required to stop a puller from pulling, and it cannot always be done in a day. If the pulling is from excitability, the horse must be handled by competent hands; or driven in harness paired with a quiet horse. If from fear, the cause must be removed; he must be made accustomed to the object that causes the fear. The voice will do much good. If from pain, remove it. Examine the tongue, bars of the mouth, lips, roof of mouth, and the teeth; there may be a piece of wood wedged in between two of the teeth, or there may be sharp points digging into the mouth. Wolf-teeth or cutting of permanent teeth may be the cause. The bit may not fit.

If pulling is due to a bad mouth, it means that the horse has been handled badly, and it will take many weeks, or even months, to get his mouth better. It may be necessary to turn him out to pasture for six months and then to remount and retrain him. Generally, though, good hands will soon flex the horse's jaw, place his head and collect the horse and make him cease bearing or holding on to the bit.

When riding, keep your legs back and have a give-and-take feeling on the reins. Sticking your legs forward and sitting back leaning on the reins will encourage the horse to pull.

Severe bits are the cause of many pullers. Bearing-reins (*see* page 131) will ruin any horse's mouth.

If a horse is going too fast, a dead pull on his mouth will not stop him, it will teach him to pull; the mouth must be played with by a give-and-take feeling. Pain excites horses to motion.

Race-track trotting-horses are taught to go their fastest by being hung on to with a dead pull, and when it is required to ease them, a playful feeling is resorted to. Horses which apparently cannot be handled except in severe and brutal bits, should be handed over to a competent horseman. If the horse has a tender mouth, a thick mouth-piece must be used. Change the bit and see the result. Rubber- or leather-covered mouth-pieces may answer the purpose, but their general use is not advocated.

Runaways.—A runaway is caused by fright, severe bits, very bad previous handling, or merely excessive exuberance of spirits. Remembering that motion stimulates excitement and how susceptible the horse is to excitability to motion, we have to use much tact in stopping a runaway. Sawing at his mouth will usually do little good; it is far better to give him a slack rein and let him drop the bit and then to pull his head in towards his chest; then again give him his head and again repeat the drawing in. With this he has nothing to hold on to and will soon give in and, in most cases, pull up.

One needs a strong arm to stop a bad runaway, because after each easing of the reins, great strength is used in drawing the horse's lower jaw into his chest. By this method I have never seen a runaway that was not stopped; and very often in a surprisingly short distance. The mouth should not be jerked, because any pain will only aggravate the case. This is most important. Nor must he be shouted at; but every endeavour made to quieten him by a soft tone of voice.

Tying up Horses.—It is strange that many horsemen do not know how to tie a horse up securely and humanely. A horse that will not stand untied should be secured by a rope tied to the noseband, or bit-ring, or to a halter put on over the bridle, the other end of the rope being secured to a rigid object, and on no account to one that will break away if the horse pulls back. Most disastrous accidents have happened through horses being fastened to boxes or rotten fences that have moved on being pulled, and caused the horse to run away with the object at his heels or under his legs. It is very dangerous to tie a horse to a single picketing peg, as it can be so easily pulled up. If a horse is tied to a smooth post, the rope must be secured so that it will not slip down when the horse lowers his head; because, when this happens, he will find his head held down—to which a horse frantically objects—and he will pull back and break the rope or head-collar, or even pull up the post. Some country houses supply rings outside their gates or doors to which horses can be tied. Care must be taken that the posts or walls to which these rings are fastened are quite secure. I saw a horse once pull a stone post up, and career over the country with it between his legs.

The method used on the American Continent for tying up a harness-horse when standing in the street, is very satisfactory. In big cities the by-laws forbid that a horse be left standing unless secured. A five-pound circular weight is carried on the vehicle at the driver's feet; to this is attached a five-foot strap with a spring snap at the other end. As the driver gets off the vehicle he takes the weight and puts it near the horse's fore-feet and the hook on the bit. Some commercial firms that do short-distance delivery, have an extra rein on the near side of the horse to which is attached this weight; the driver drops it on the ground as he gets off the vehicle, thus saving much time. Care must be taken that the weight cannot drop off while the vehicle is in motion, as it would give the horse a severe jerk in the mouth.

A saddle-horse should be taught to stand whenever the reins are passed over his head. (*See* page 50.)

Patience must be used in all such teaching. General Grant once stated, after he had punished a teamster for abusing his horses: "If people only knew how much more they could get out of a horse by gentleness than by harshness, they would save much trouble to themselves and the horse."

CHAPTER V

ANATOMY OF THE HORSE'S BACK. SADDLES AND SORE BACKS. BITTING. DRAUGHT AND HARNESS.

STRUCTURE of the Back.—No part of the horse's harness causes more trouble than the riding-saddle; and most of this is the result of misunderstanding on the part of the saddler or groom, or of bad riding on the part of the rider. Saddle-galls are nearly all due to pressure, uneven or continuous. With proper care, there is no reason why a saddle should cause a gall.

In the past we find that armies have been handicapped in campaigns through the lack of knowledge on the part of the responsible horsemasters. Owing to their ignorance of saddle fitting, of the treatment of injuries, and through bad riding and gross carelessness, the horses suffered intense torture.

A thorough study of the anatomy of the horse's back is essential to every horseman. The withers, shoulders, girth and loins are included in this study.

The illustrations on pages 98 and 99 show the bony structure of the back. The body, consisting of thorax, abdomen and pelvis, is partly enclosed by the tops of the limbs, the vertebral column, breast-bone, and the ribs. The vertebral column in the horse is, more or less, a horizontal chain of bones extending from the head to the tip of the tail. The column is attached by muscles only to the shoulder-blades and by ligaments to the pelvis, at the top of the hind-limbs. The horse has no collar-bone (clavicle), the serratus magnus muscle on each side being the chief union between fore-limb and body. The vertebræ are divided into: 7 neck (cervical); 18 back (dorsal); 6 loin (lumbar); 5 croup (sacral) and about 17 tail (coccygeal). Those which concern us here are the dorsal. The first eight of these have true (sternal) ribs attached to them, the lower ends of which are attached to the breast-bone (sternum). The remaining ten have false (asternal) ribs attached to them; the other ends of which are attached by long pieces of costal cartilage to the end of the sternum.

The first rib is the shortest, the ninth the longest. Their curva-

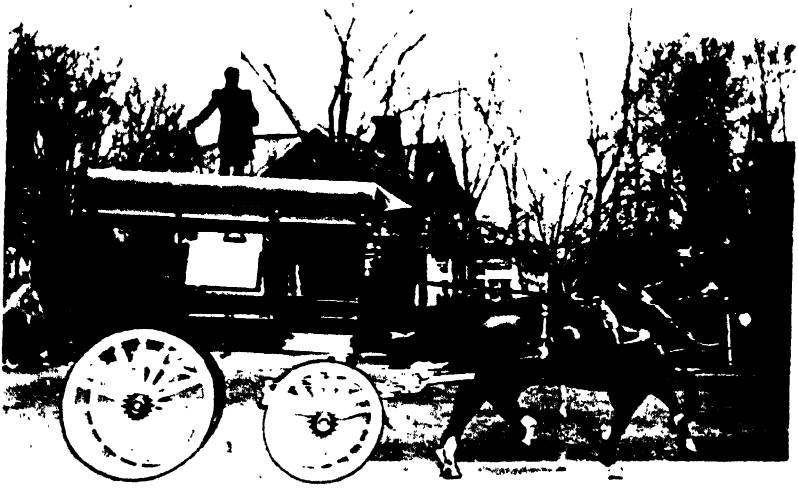
CARRIAGE AND PAIR

SLEIGH AND PAIR

HEAVY PAIR HARNESS

TROTTER IN ACTION: MAJESTIC

HACKNEY PONY: GARLAND



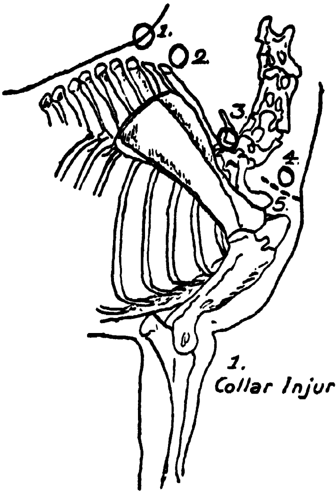
PAIR IN ACTION

ture increases from the first to the eighteenth. The true ribs are wider and flatter; the false, semicircular. The sixth and seventh, which cover the heart, are very wide. The ribs project out almost horizontal for a few inches on each side of the vertebræ, before they curve downwards. It is on this horizontal portion, and on nowhere else, that the entire weight of the saddle must bear.

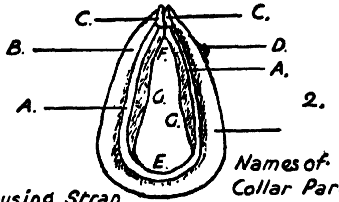
As the horse inhales, muscles draw the ribs forward and outward, which increases the capacity inside; the ribs pivoting at their extremities. Hence the girth of the horse's chest increases considerably when he inhales. This expansion is very slight immediately behind the shoulder-blades. Therefore a girth cannot be used too far back, nor should it ever be excessively tight. The first rib is the only one that does not move at all.

Now let us consider which portions must not bear weight. The loins, situated behind the last rib, and in front of the hip bones, must not do so. They consist of a muscular roof to the hind portion of the abdomen and the kidneys. When a second rider sits on the horse's haunch, he should sit back on the croup and not on the loins. No weight must be borne by the tops of the vertebræ or the spinal ridge. Nothing must rub this bony ridge, which is formed by the spinous processes at the top of each vertebra. These spines increase in length from the first to the fourth or fifth, and decrease to the twelfth, and are of the same length from the thirteenth to the eighteenth. They slope backwards from the first to the thirteenth or fourteenth, the fourteenth or fifteenth is vertical, and they slope forward from the fifteenth or sixteenth to the eighteenth. The twelfth or thirteenth is the smallest and thickest. The bodies of the vertebra increase in size as we pass back. The spinal column in the horse is an arch, with its apex at the fourteenth or fifteenth dorsal vertebræ. This arch is trussed by powerful muscles woven in between the spines and by a powerful muscle under the column (longus colli), as well as by many ligaments, both elastic and inelastic. This arch can be bent to a certain extent at the will of the horse.

The first six or eight of these spines form the withers. On the top of all these spines there is a white, non-elastic ligament; over the withers this ligament is interwoven with the rear end of the yellow elastic ligamentum nuchæ, which supports the weight of the head. Pressure or friction on any of the spines will cause disease which will spread to the bone itself; but injury to the top of the withers is much more to be dreaded, because the yellow



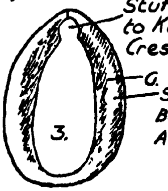
1.
Collar Injuries.



Names of Collar Parts.

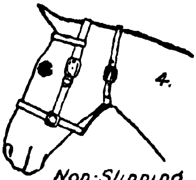
D=Housing Strap.
E=Throat.
F=Neck.
G=Stuffed Body.

A=Fore Wale.
B=After Wale.
C=Caps.

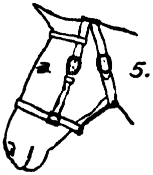


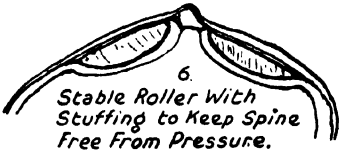
Stuffing Arranged to Keep Collar off Crest, And Avoid Injury No. 1.

Stuffed Body, Beneath After Wale.

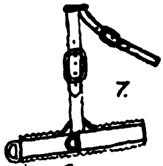


Non-Slipping Head Collars.

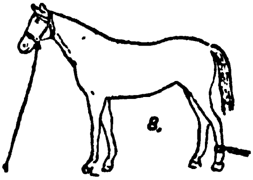




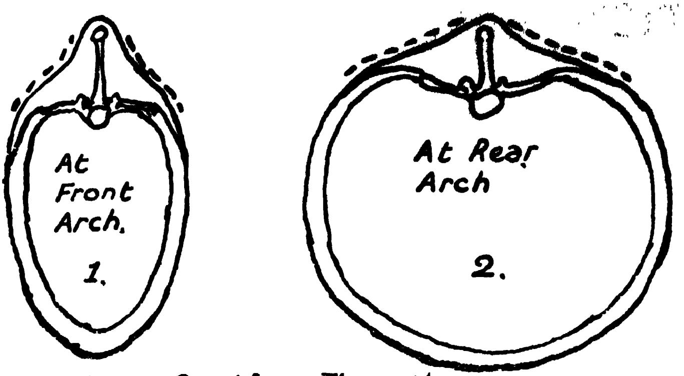
Stable Roller With Stuffing to Keep Spine Free From Pressure.



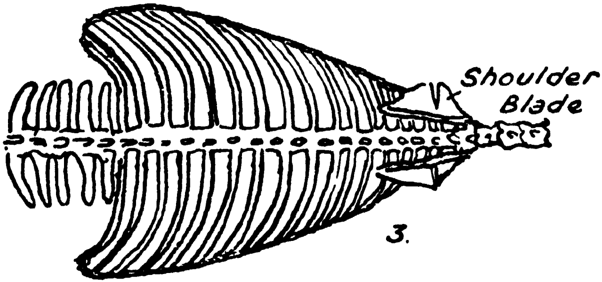
Lounging Cavesson
(Nose-Band Lined With Felt).



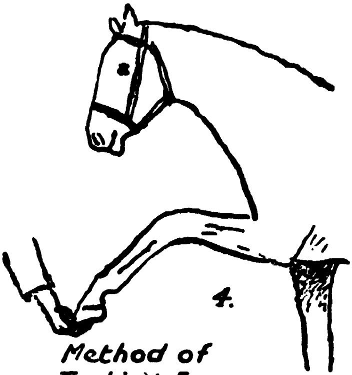
Correct Method of Picketing.



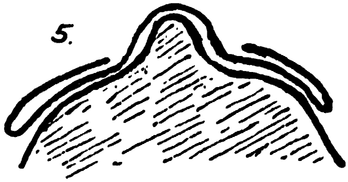
Cross Sections Through Horse Showing Extent of Weight-Bearing Surface.



View of Ribs And Spine From Above.



Method of Testing For Blade-Bone Pressure.



Section of Back Showing Method of Folding Blanket to Raise Arch of Saddle Temporarily Above The Withers.

ligament will also be involved. This is why fistulous withers are always so serious.

Position of the Saddle.—Let us study the weight-bearing part of the back—the upper ends of the ribs. The slope of this part near the shoulders is steep, whilst near the loins it is almost horizontal. The front part of a saddle will therefore tend to slip downwards and pinch the horse. Fortunately, the bottom ends of these ribs are securely fastened to the breast-bone; this prevents the girth from interfering with the lungs and heart. The illustration on p. 99 shows a cross-section of the back at the front and at the back of the saddle. It is, therefore, clear that there is a considerable twist in the plane on each side of the spine.

These bones are covered with a fairly thick layer of muscle (longissimus dorsi), fascia and skin, as well as fat of variable thickness. Nature will not permit of bone bearing any direct weight. Any foreign substance pressing on, or rubbing bone will destroy the fine skin that covers it (periosteum) and cause the bone to decay. As the ribs are well protected with this muscular cushion, risk of injury is non-existent if the pressure is evenly distributed and not of too long duration.

Great attention must be paid to see that no bony ridge or prominence has any portion of saddle or equipment touching it.

Great care must also be taken that there is no uneven or severe pressure on these weight-bearing muscles of the back. Sore backs, or saddle-galls, are deep-seated injuries to these muscles. These wounds, as well as fistulous withers, are very liable to become deep-seated, the pus boring its way downwards. In that case drainage from the bottom is essential and the wounds must heal from the bottom.

The area that the saddle can rest on is limited: it must not extend closer to the spine than one inch on each side; the outer edge must not be too far down the horse's side; in front, the action of the shoulder-blade prevents it going too far forward; behind, it must not extend beyond the ribs: that is, it must not bear on the loins.

As the horse's fore-leg moves forward, the top of the shoulder-blade moves back, as if this bone were pivoted one-third way down its median line. Therefore, when the leg is well forward, the saddle must not interfere with the top of the shoulder-blade. The shoulder muscles also bulge out and the saddle must not interfere with these either.

The shape of the back and shoulders will materially affect the position in which the weight should be carried, and the extent to which the weight will move when the horse is in motion. A saddle more often tends to work forward than backward. The lay of the coat helps us to prevent the saddle working forward. With deep chests, and ribs running up light behind, like those of a greyhound, a saddle will tend to slide back. A breastplate will rectify this. Although the saddle may tend to work forward, the blanket or numnah under it will tend to work back in the direction of the lay of the coat. The blanket or numnah must be buckled to the saddle.

The front portion of the saddle should fit snugly into the hollow behind the shoulder-blade; this will prevent forward movement.

Types of Backs.—A short back is stronger, and generally wider in the loin. A back cannot be too short for saddle work (except for ladies' side-saddles). A short back, with good sloping shoulders and sufficient length in the haunch, will give ample room underneath.

The withers should be of moderate height and not too thick. Very high withers are liable to injury, and require special saddle fitting; but low withers generally cause a tendency for the saddle to go forward. They are generally wide and liable to pinching and show low action in front. High withers generally indicate good front action, which indicates a safe saddle-horse.

Hollow backs are comfortable to ride on, but generally denote weakness. Roach backs are strong but uncomfortable. A wide-backed horse has a large saddle-bearing surface and good lung space and is eminently suited for long rides. A narrow back, with flat-sided ribs, is unsuited to bear weight, and such horses are deficient in stamina.

Distribution of Weight.—As most of the horse's weight is carried on his fore-legs, the hind-legs being used chiefly in propulsion, and as two-thirds of the weight of the saddle and rider is borne by the fore-legs, it is essential that the rider should sit well back on the horse and that the horse's head and neck are carried in a correctly elevated position. As his head is raised, the weight on the fore-legs is very considerably decreased. The better the slope of the shoulder the farther back will the saddle also rest. Hence the necessity for proper conformation, and placing and training of the saddle-horse.

Pressure.—Great care must be taken that there is no uneven pressure placed on the muscles of the back, and that no buckles, straps or ridges in the blanket, etc., are allowed under the saddle. Uneven stuffing in the saddle, riding crookedly, or an improperly folded blanket, are common causes of uneven pressure. Pressure drives the blood out of the blood-vessels, and in time the cells, through lack of vital food, die, and decay sets in; matter (pus) is formed. If one's finger is pressed hard against the back of the hand and removed, a white spot shows where the blood has been temporarily driven out. The same happens under the saddle where there is any lump. Saddle-galls very often, when healed, leave permanent white patches on the horse's back. These are only too common. Even the normal weight of the rider and saddle causes the subcutaneous blood-vessels to become denuded of blood, but this leads to no permanent injury if not prolonged beyond an hour or two.

A rider, however, should never sit in the saddle for hours on end; such a practice shows gross lack of horse knowledge and incurs the risk of producing saddle-galls. On the other hand, a saddle should never be taken off the moment the rider dismounts, but, after the girths have been loosened, it should be left on for five or ten minutes, to allow the blood to run back slowly into the denuded blood-vessels under the skin. By removing the saddle suddenly these vessels may become ruptured, causing lumps on the back; this liability attaches especially to thin-skinned horses, such as Thoroughbreds. In any case, the back should be vigorously smacked and rubbed against the hairs as soon as the saddle is removed, to restore normal circulation.

Saddles.—All saddles are built on the same principle; a flat side-bar is placed on the ribs on each side of the spine, and these are kept in place by a steel arch at each end. The side-bars are generally of ash or beech, and have a twist on their surface to conform with the shape of the back. A straight side-bar would rock. The front arch, called the pommel, must be very strong, and of good steel, to obviate spreading. It must be wide enough to prevent pinching and high enough to clear the withers. If it spreads it will drop on to the withers. The rear arch is not so subject to spreading, but may break down owing to the weight in the saddle, and will then press on the back.

In the military saddle, the use of the saddle-blanket necessitates the arches being higher and the side-bars wider. In these saddles, too, the side-bars are extended forward (burrs) and backward (fantails) to allow the cloak and other kit to be carried and kept clear of the horse. The tree of the saddle is the side-bars and two arches. The military tree is larger, because it has to carry more weight; and the extra size allows for distribution over a greater area.

The objection I have to the universal pattern military saddle is the shortness of the seat and its extreme curvature, due to the high arches.

Now that wallets are dispensed with there seems to be no necessity for the present type. A pattern more resembling the French cavalry saddle, that is on the lines of the hunting saddle would produce far better riders. I used a hunting saddle for several years in the war, and found it most satisfactory on numerous long marches and in cavalry actions. A large haversack was carried on the rider in the place of the wallet. Nosebags, shoe-case, etc., were attached to D's on each side of the saddle.

The bearing surface of pack-saddles needs to be much larger than that of a military saddle.

The seat of the saddle is formed by longitudinal lengths of webbing, stretched from arch to arch, and other transverse lengths from side-bar to side-bar, over the longitudinal lengths. The leather seat is then shaped and stretched over this web.

The shape of the saddle-tree, then, depends on the shape of the horse's back. A hunting saddle, if well stuffed, will fit a great number of horses, provided the front arch is high and wide enough, and the rear arch high enough; but the tree of a military saddle has to be rectified to almost every new horse. The hunting saddle has stuffed panels, but on active service they would not be practicable; the bare tree, with felt panels and a saddle-blanket, is found the most suitable. The panels of a hunting saddle are lined with stout flannel or leather, of which the former is preferable. Cork and pneumatic panels have been used: the latter are not practical, because they soon leak. Self-adjusting side-bars for military saddles have been used; but, except in the case of pack-saddles, are not of any advantage. Hunting-saddle panels are stuffed with horsehair or flock, which can be readjusted to suit a change in shape of back. A thin felt numnah should be used under the saddle to protect it, especially when the horse perspires a good deal.

The tree is the essential part of a saddle; the seat and saddle-flaps are only luxuries to add to the comfort of the rider and horse. The hunting saddle has large, padded sweat-flaps that protect straps or ridges in the blanket, etc., are allowed under the saddle. Uneven stuffing in the saddle, riding crookedly, or an improperly folded blanket, are common causes of uneven pressure. Pressure drives the blood out of the blood-vessels, and in time the cells, through lack of vital food, die, and decay sets in; matter (pus) is formed. If one's finger is pressed hard against the back of the hand and removed, a white spot shows where the blood has been temporarily driven out. The same happens under the saddle where there is any lump. Saddle-galls very often, when healed, leave permanent white patches on the horse's back. These are only too common. Even the normal weight of the rider and saddle causes the subcutaneous blood-vessels to become denuded of blood, but this leads to no permanent injury if not prolonged beyond an hour or two.

A rider, however, should never sit in the saddle for hours on end; such a practice shows gross lack of horse knowledge and incurs the risk of producing saddle-galls. On the other hand, a saddle should never be taken off the moment the rider dismounts, but, after the girths have been loosened, it should be left on for five or ten minutes, to allow the blood to run back slowly into the denuded blood-vessels under the skin. By removing the saddle suddenly these vessels may become ruptured, causing lumps on the back; this liability attaches especially to thin-skinned horses, such as Thoroughbreds. In any case, the back should be vigorously smacked and rubbed against the hairs as soon as the saddle is removed, to restore normal circulation.

Saddles.—All saddles are built on the same principle; a flat side-bar is placed on the ribs on each side of the spine, and these are kept in place by a steel arch at each end. The side-bars are generally of ash or beech, and have a twist on their surface to conform with the shape of the back. A straight side-bar would rock. The front arch, called the pommel, must be very strong, and of good steel, to obviate spreading. It must be wide enough to prevent pinching and high enough to clear the withers. If it spreads it will drop on to the withers. The rear arch is not so subject to spreading, but may break down owing to the weight in the saddle, and will then press on the back.

In the military saddle, the use of the saddle-blanket necessitates the arches being higher and the side-bars wider. In these saddles, too, the side-bars are extended forward (burrs) and backward (fantails) to allow the cloak and other kit to be carried and kept clear of the horse. The tree of the saddle is the side-bars and two arches. The military tree is larger, because it has to carry more weight; and the extra size allows for distribution over a greater area.

The objection I have to the universal pattern military saddle is the shortness of the seat and its extreme curvature, due to the high arches.

Now that wallets are dispensed with there seems to be no necessity for the present type. A pattern more resembling the French cavalry saddle, that is on the lines of the hunting saddle would produce far better riders. I used a hunting saddle for several years in the war, and found it most satisfactory on numerous long marches and in cavalry actions. A large haversack was carried on the rider in the place of the wallet. Nosebags, shoe-case, etc., were attached to D's on each side of the saddle.

The bearing surface of pack-saddles needs to be much larger than that of a military saddle.

The seat of the saddle is formed by longitudinal lengths of webbing, stretched from arch to arch, and other transverse lengths from side-bar to side-bar, over the longitudinal lengths. The leather seat is then shaped and stretched over this web.

The shape of the saddle-tree, then, depends on the shape of the horse's back. A hunting saddle, if well stuffed, will fit a great number of horses, provided the front arch is high and wide enough, and the rear arch high enough; but the tree of a military saddle has to be rectified to almost every new horse. The hunting saddle has stuffed panels, but on active service they would not be practicable; the bare tree, with felt panels and a saddle-blanket, is found the most suitable. The panels of a hunting saddle are lined with stout flannel or leather, of which the former is preferable. Cork and pneumatic panels have been used: the latter are not practical, because they soon leak. Self-adjusting side-bars for military saddles have been used; but, except in the case of pack-saddles, are not of any advantage. Hunting-saddle panels are stuffed with horsehair or flock, which can be readjusted to suit a change in shape of back. A thin felt numnah should be used under the saddle to protect it, especially when the horse perspires a good deal.

The tree is the essential part of a saddle; the seat and saddle-flaps are only luxuries to add to the comfort of the rider and horse. The hunting saddle has large, padded sweat-flaps that protect the horse's sides from the girth-tabs and the ends of the girths. The military saddle has only small leather sweat-flaps under the girth-buckles and tabs.

Fitting the Saddle.—With a military saddle, the bare tree is shaped as near as possible to the horse's back by the saddle-tree maker. The correctness of the fit is ascertained by placing a folded blanket on the back, the tree on top of this and a rider on the tree for a few minutes. The indentations left on the blanket will show which portions of the tree require to be spoke-shaved off, and which portions built up with leather or felt. The bars of the tree must fit the back as a boot should fit a human foot. We all know what it is to take a long walk in a badly-fitting pair of boots. With the military saddle we have the added difficulty of fitting the burrs and the fantails. With some horses with thick, low withers, it is impossible to prevent such a saddle from sliding forward, unless the burrs are cut off. Now that the cavalryman no longer carries such an enormous amount of kit on the saddle, a lighter, modified saddle would greatly assist in saddle-fitting. As the loins of a horse roll to a greater or lesser extent, long fantails may rub these parts, especially if a horse is hollow-backed or loses condition. With a roach-backed horse the saddle may rock and cause the burrs or fantails to dig into the back.

The following important points must be borne in mind: The withers must not be pinched or pressed upon. The front arch should be an inch clear.

The vertebral column through its length must not be pressed upon.

The front part of the saddle (or burrs) must allow absolute freedom of the shoulder-blades.

The rear end (or fantails) must not touch the loins. The side-bars must distribute the weight evenly over the weight-bearing portion of the back.

A short back, therefore, requires a short tree; a broad wither requires a wide front arch; a wide back, a wide tree, and vice versa.

The principle is the same with hunting saddles, but as a rule the tree is not altered by the saddler. A saddle is chosen with the side-bars of the right width and the arches of the right height and width. The saddler then is able to make necessary adjustments by altering the stuffing in the panels. Every hack or hunter should really have its own saddle.

The saddle should be tested for correct fitting after it has been placed on the numnah or saddle-blanket and a man has sat in it. The front arch is tested while the rider leans forward; the rear arch while he leans back. The fingers should pass easily under both arches; and in the military saddle the hand should pass under the fantails. Blade-bone pressure is tested by one fore-leg being held straight out to the front by the toe of the hoof; the fingers should then be able to be passed behind the shoulder-blade without being pinched. Both shoulders should be tested. (*See* page 99.) The rider dismounts and uneven impressions on the saddle-blanket are looked for as soon as the saddle is lifted gently off.

Saddling.—In placing the saddle on the back, it must not be dropped on. It should be lifted quietly from the near side over the hind-quarters and placed on the back a little forward of its correct position, and slid back with the lay of the coat into place; the girths having first been lain across the seat of the saddle. Care must be taken not to hit the horse with the stirrups. Then ascertain that the pad, numnah or blanket, is perfectly smooth and in correct position and free of wrinkles, and lifted a little up into the arches of the saddle. The girths should be done up loosely; they must never be done right up at first; after the horse is bridled and ready to be mounted, they should be tightened up, and this should be done gently and not with a jerk. It is common to see horses girthed up in a very inhumane way; such actions cause horses to blow themselves out, a practice that they will never attempt if girthed up properly from the first. A horse with the saddle on and girthed up should not be turned round in a narrow stall. There is a great tendency to place saddles too far forward.

Some horses attempt to kick or buck when first mounted; they suffer from what is known as a cold back, the remedy is often to warm the numnah before putting it on. Never leave a horse loose with the saddle on; he may roll and break the saddle-tree.

Great care must be taken that numnahs, etc., are quite dry when put on the horse, and in very cold stables they should be slightly warmed. Damp or cold saddles may cause a horse to kick, or to roach their backs when first mounted. With a freshly-clipped horse, a damp saddle may harm the skin.

Directly the rider dismounts at the end of a ride he should slacken the girths a couple of holes.

If the back is still wet when the saddle is removed, it must be dried by vigorous hand-rubbing. Or if the saddle is removed temporarily to ease the back, vigorous hand-rubbing for a couple of minutes must be resorted to.

Saddles and numnahs and other horse gear should be kept in a dry and warm, but not over-heated, saddle-room. Leather linings and numnahs are easy to keep clean, and can be kept soft with good saddle soap, but felt and flannel absorb the sweat much better. These must be thoroughly dried out in the sun or before a fire and then brushed dry with the body brush. Weak ammonia can be used to remove caked sweat. All parts must be kept free from hairs and grease.

All buckles and straps on saddlery and harness are made, whenever possible, to do up from the near-side. The horse is always saddled and harnessed from the near-side. Free ends of straps are usually made to point towards the horse's tail.

Saddle-blanket and Numnah.—In folding the blanket great care must be taken to see that there are no wrinkles or uneven folds in it. The military saddle-blanket measures 5 ft. 5 in. by 4 ft. 8 in. It is usual to fold it into four and to place it on the back with the longer dimension across the horse, with the free edges of the blanket to the rear and near side. If the side-bars need to be raised higher, and more room is required under the seat and arches, the blanket can be folded twice along its length; when thus folded it measures 5 ft. 5 in. by about 1 ft. 8 in. This is placed across the back, and the ends brought up to an inch from the spine, on each side. This folding is liable to shift. Other methods of folding may be used to raise one portion of the saddle if required.

As already stated a thin (⅜") felt numnah is the best kind to use. The colour should be brown, fawn, or blue. A strap on each side is used to attach it to the sweat flaps and prevent slipping. The numnah must be a little larger than the sweat-flaps.

Girths.—Girths are made of leather (usually split to prevent slipping), webbing (blue or white), cord, rawhide, hemp or twisted wool. With webbing we use either two single girths, or the Fitzwilliam, which consists of one broad girth that buckles on the outer tabs, and a narrow centre girth outside, which buckles on the centre tab. All hunting saddles have three girth-tabs screwed on to the side-bars on each side of the saddle. Web girths must be kept well brushed and quite clean.

With all saddles, the leather girth is found to be the most practical. It lasts many years with severe work, and is very easily cleaned and kept soft with saddle soap. If it becomes hard, a little neatsfoot oil, rubbed well in, will remedy it. Longitudinal slits are cut in it to allow for ventilation and prevent slipping.

In the hunting saddle, the girth-tabs are attached to the side-bars, about one-third the way from the front. In the military saddle there are only two girth-tabs, which are attached to a leather flap, fastened by two straps to the side-bar. These two straps form a V, the flap being at the apex of the V. The whole is known as the V-shaped attachment.

The front strap is fastened to a buckle and can be adjusted to three different lengths. The normal position is the centre hole. If it is required to bring the girth farther forward, the front strap is shortened and vice versa. In normal position the front strap of the V-shaped attachment is shorter and more vertical than the rear one, which brings the flap—to which the two girth-tabs are attached—below a point one-third distant from the front of the side-bar.

On normally shaped horses the girth is prevented from slipping forward by the breast-bone. The use of a foot of motor-tyre tubing, slipped over the girth at its centre, will generally prevent a girth slipping. It is difficult at times to prevent a girth going forward, and as a temporary means a surcingle is put around the fantails of a military saddle and a small strap passed from it (under the belly) to the girth, thus keeping the girth back. The surcingle must not be tight. The girth on a race-horse should be as narrow as possible and should be well forward, so as not to interfere with the breathing.

A girth should never be excessively tight and must allow of one finger being placed under it easily. The finger should be inserted in the back edge forward, so that it will smooth the hair the right way when it is withdrawn.

The better the rider the looser the girth he can use without any danger of causing saddle or girth injuries.

A surcingle on a military saddle must be flat over the girth and not tight enough to wrinkle the latter.

Breast-plates are seldom used now. They are sometimes necessary on horses that cannot keep their saddles forward. They should fit so that the upper edge of the rosette is three fingers'-breadth above the sharp breast-bone, and admit one hand's-breadth between it and the horse's breast.

Stirrups—Stirrup means a "mounting-rope." The stirrup must be large enough to allow the foot to be placed "home," and withdrawn quite easily. *It is dangerous to ride in wide boots that might catch in the stirrups in the event of a fall. Nickel or other* white metal stirrups are commonly used now; they are quite satisfactory and are easily kept clean. If of nickel, the leathers should *be taken off daily and the parts in contact with the metal well cleaned and soaped, otherwise the leather will be destroyed.*

Stirrup-Leathers.—Stirrup-leathers should not be too thick and must have the holes punched evenly in pairs. A pair should be marked R and L. The leathers should be changed over every *week, otherwise the near stirrup will stretch more than the other, owing to the strain of mounting* and dismounting. One week L *can be worn on the near-side, the next week on the off-side,* and so on. If the leathers are too long, they should be shortened at the buckle end. It is advisable to have new leathers rather long, then every few months, or when the part in contact with the stirrup-iron becomes worn, they can be shortened an inch at the buckle end. It is a good plan to have the holes numbered.

It is most important that stirrup-leathers should be of equal length; to test this they should be taken off the saddle. The free end of the leathers should not be passed down through the buckle, but turned under the buckle end and passed towards the back of the saddle under the rider's thigh. It is then so much easier to adjust the length of the stirrup while in the saddle. The spring-bars on the saddle that support the stirrup-leathers, should not be kept closed; the catches should be left down, so that the leather will slide off in the event of an accident.

Sore Backs: their Prevention and Cure.—Every sore on the horse's back is due to a definite cause that can be easily ascertained and remedied, and further injury prevented. A thorough study of the anatomy of the back and the principle of the saddle and saddle-fitting is essential, as I have already indicated in the early part of this chapter.

Galls are caused either by friction or pressure. Grooms must be encouraged to show the first sign of a sore or lump, and severe action should be taken against one who hides an injury of this, or any other nature. Bad riding is responsible for very many saddle or girth injuries, but badly fitting and badly put on saddles also cause a great many. As most saddle-galls are from pressure, bad riding will not cause a gall if the saddle fits properly. If a rider gets uneasy or sore in the saddle, he should dismount and walk, and thus ease himself and his horse, and lessen the chance of a gall. If a rider galls a horse, then he *must* walk. Quitting the stirrups on a long march should not be allowed; the best way to stretch the legs is to get off.

Galls.—Galls may be caused by such careless practices as strap-ends under saddle or numnah, numnah or saddle-cloth not properly strapped to the saddle; sweat-flaps or panels turned up at the corners or edges; part of equipment, cloak or pack touching the horse; creases in the saddle-cloth or blanket; girth too loose and surcingle too tight.

The better the condition of the horse the less liable is he to get galled. Old, ill-fed, bad or soft-conditioned horses get galls on the slightest provocation. The fantails of military saddles are very liable to rub the loins if they are not well clear of the back, and especially when ridden by a poor rider.

The cause of the gall must be first ascertained and removed. If the withers are being pinched, a new saddle must be used, or the stuffing altered, or the blanket folded differently; if the saddle is raised higher by an extra numnah or refolding of the blanket, it may answer the purpose. If the spine is being rubbed or pressed upon, the numnah must be forced farther up into the arch of the saddle, or thicker padding put under the tree to raise the seat. Injuries from the burrs or fantails can be prevented by folding the blanket shorter or thicker (in the case of the military saddle). Injuries from the edge of the side-bar can be prevented by taking off some of the edge, or building up the other portion, or by special folding of the blanket, or in a hunting saddle, by altering the stuffing. Uneven pressure is rectified by re-stuffing, altering the surface of the side-bars or using a thicker pad under the saddle.

Girth-galls are caused, as a rule, by friction and, in most cases, by the saddle and girth working forward. Covering the girth with a piece of rubber inner-tube or the use of string or rawhide girths is advisable. (*See* page 107.) Girths must be properly adjusted, and sufficiently tight to suit rider and horse, to prevent slipping.

A horse with round, wide ribs, and elbows close to the sides, is more liable to girth-galls from the girth going forward.

Cure of Galls.—A saddle-gall situated in the muscles of the back is a deep-seated abscess and, therefore, contains more or less pus; this is caused by uneven, severe pressure, and first shows itself as a small lump. If the cause of the lump is allowed to continue, the lump turns into a gall. If, however, when the lump is first discovered, the cause is ascertained and removed, a gall will not form. It takes many hours as a rule to cause a gall, and it is most unlikely that one ride of a few hours could do so; it *can* produce a lump, which would be discovered by the rider or groom when examining the back after the saddle was removed. Hence the great importance of always examining the back for any slight lump after off-saddling. An open pressure-gall means that the first sign of a lump was not discovered. This is a very important point.

On the other hand, a girth-gall, which generally is a friction-gall is not a muscle abscess, but only a superficial injury to the under-skin due to friction, which is far more easily cured and in a very much shorter time than a saddle-gall. But girth-galls are liable to recur, and as a rule, a horse cannot be used in the saddle while suffering from one.

The exact cause of the injury must be ascertained; if it is not due to carelessness as already mentioned (*see* page 109), it is due to an ill-fitting saddle or some foreign object getting into the stuffing or numnah. Put a little chalk or powder on the lump or gall, and replace the saddle in its normal position. Press on it and then remove it. The chalk or other mark that will be found on the under-side of the saddle indicates the seat of the cause of injury.

It should not now be very difficult to discover what it is. If no definite cause is revealed, uneven pressure of the tree can be looked for by placing the saddle on several folds of blanket and putting the rider on the saddle. The uneven impressions in the blanket will be quite distinct. If it is necessary to continue working the horse, a hole may be cut in the numnah or blanket, or the stuffing in the panel over the seat of injury removed and a few stitches put in the panel to keep that part free of stuffing. But the best cure for sore backs is rest.

Altering the stuffing, refolding the blanket, altering the tree, changing the saddle or other means must be at once adopted and the injury itself treated as an open sore. (*See* page 261.)

If there is only a lump, a cold solution of common salt should be applied; if it is rather big and hard, iodine ointment is beneficial. Cold-water douches, followed by an application of an astringent lotion, is often best. A good astringent lotion is Dick's White Lotion: 1 oz. each of lead acetate and zinc sulphate to a quart of water (30 gms. of each to 1 litre of water).

If the gall is broken, it must be made aseptic with creolin solution, any foreign matter removed and bathed every few hours with

White lotion. An excellent gall ointment, in the place of the lotion, is:

Lead acetate	1 oz., or 30 gms.
Zinc sulphate	1 oz., or 30 gms.
Bismuth subnitrate	¼ oz., or 7 gms.
Carbon (powdered)	½ oz., or 15 gms.

Well mixed together, and then sufficient lard added to make a paste.

This should be applied to the open gall night and morning.

Bridles.—The bridle consists of the head-stall, which passes from the bit on one side, over the poll, behind the ears, down to the other side of the bit. It should fit parallel to and behind the ridge of the cheek-bone (zygomatic ridge). The nose-band, which passes around the top of the muzzle, should be the breadth of two fingers below the cheek-bone and admit two fingers between it and the nose. It should be sufficiently rigid to keep it horizontal, and not drooping on to the horse's nose.

The throat-lash should admit at least three fingers between it and the throat, and should really only be tight enough to prevent the bridle coming off. If this is too tight, which is a very common fault, the throat is pinched and the horse will probably pull. Serious injury to the larynx may result.

The brow-band should be roomy and allow full play of the ears. White buckskin brow-bands look well, and are easily kept clean and soft.

In the military bridle the bit head-stall can be slipped off without removing the head-collar, which is separate. There is also a piece—jowl-piece—which joins the throat-lash with the nose-band at the back of the jaw.

As a rule the nose-band on a hunting bridle is separate from the bridle and has its own thin head-stall which fits through the brow-band loops inside the bit head-stall.

BITS AND BITTING

The bit, as distinct from a snaffle or bridoon, must be placed across the bars of the mouth about two inches above the corner teeth (incisors) of a mare and one inch above the tusk of a horse. This should keep it well clear of the corners of the mouth. A bit should not touch the corners: but a snaffle or bridoon is carried higher and just touches, without wrinkling, the corners of the mouth. So much depends on the shape of the mouth and on the horse's disposition, that the exact position of a bit in his mouth can only be ascertained by trial. The slightest movement up or down will make all the difference with some horses. Care must be taken, however, that the bit or bridoon is not too low, as on no account must it touch the teeth.

The curb-chain must be twisted right-handed until quite flat throughout its length. The last link is then hooked on to the near-side hook and one, two or more links taken up, so that the *chain is of the right* length, and given one extra half-turn and hooked on. Curb-straps are often used in the place of a chain on light-mouthed horses; or a strap placed inside the chain (next to the jaw). *The chain must lie flat against the chin-groove when* the curb-rein is taut. The correct length of a curb-chain is such that when it is taut the branches of the bit should be at 45° with their normal position, or the longitudinal line of the horse's head. Otherwise the true function of the curb is lost.

The curb is not an instrument of torture, nor a means of stopping pulling or runaways; it is the means of flexing the lower jaw. A lip-strap that joins the branches of the bit below the curb-chain is useful with some horses to prevent the bit being inverted when the head is thrown up, and also to prevent the branches of the bit being taken hold of by the lips.

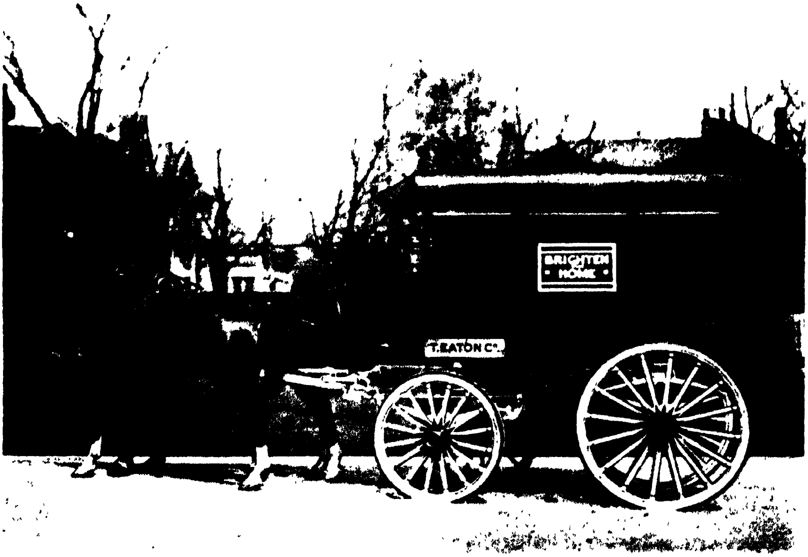
Some horses have the habit of getting their tongue over the bit. This must be stopped, because it is impossible to mouth or school a horse properly when its tongue is over the bit. The cause is very often heavy hands. A high leather-port sewn on to the port of the bit will generally stop this. Feeding the horse with a plain snaffle in his mouth may effect a cure. A change of bit may do it also.

One-sided mouths are not uncommon, and are generally caused by too much leading at exercise, always on the same side; or it may be caused by too much work on one rein, or by bad and uneven hands. The horse should be led on the other side and given more work on the rein to which he has been least accustomed. Lowering the bit on the hard side may be beneficial. The rider should endeavour to have a stronger feeling on the rein opposite to the hard side.

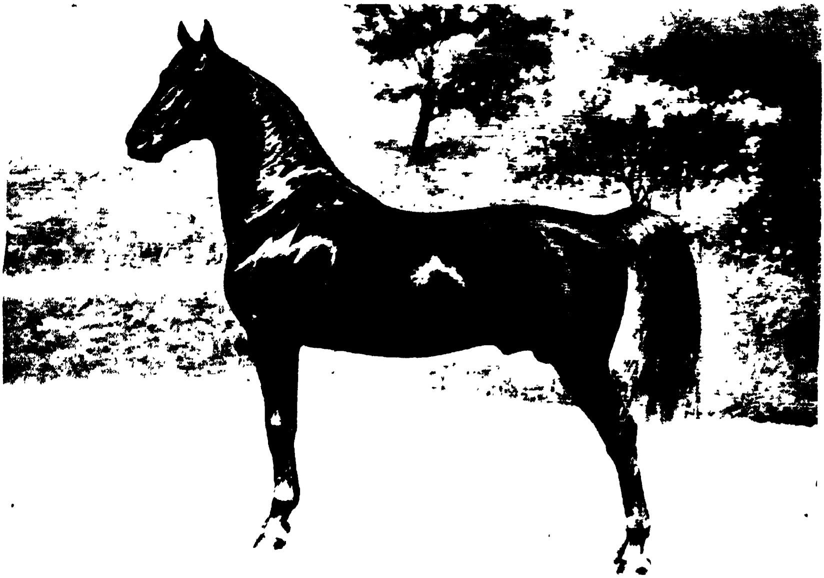
Types of Bits.—There is a great deal of abuse caused by the use of bits quite unsuitable for any type of horse. Gross lack

Photo: W. A. Rouch

CLEVELAND BAY COACH HORSES



A PAIR OF BAYS



SADDLE-HORSE: KOROSKO

Photo: Haas, New York

SADDLE-HORSE: COPPER KING

of horse-sense and knowledge of management is shown, and is responsible for such a high percentage of bad mouths. The majority of the fancy bits one sees in a saddle-room, should be thrown on the scrap-heap. The early training of the horse (*see* Chapter III) must be in a thick bridoon or a snaffle. The mouth-piece should be broken. The old type of cross-bar snaffle is useful, for it cannot slide through the horse's mouth, as can a plain ring-snaffle. It is generally necessary, later on in the training, to use a bit with curb. The best bit for a saddle-horse is a Weymouth, in which the bridoon is separate, and there are only the bit-reins proper on the lower ends of the branches or cheek-pieces of the bit. (Plate facing p. 81.)

It is essential that the bit should be of correct width, so that there is about ¼ in. on each side of the lips inside the branches. If it is wider, the bit will rock or work over to one side and cause a one-sided mouth; if it is narrower it will pinch the mouth.

The Pelham bit suits some horses better than the Weymouth. (Plate facing p. 128.) It has no separate bridoon, the bridoon or upper reins being fastened to rings on a level with the mouth-piece. A Banbury Pelham has the branches or cheek-pieces swivelled on the mouth-piece, and is useful with some one-sided mouths. A Pelham bit is often very suitable for horses shown in saddle classes (as distinct from hunters). Other forms of bits have no particular advantage and need not be discussed here.

The universal pattern military bit is the Portmouth reversible, and is a type of Pelham, with a heavier mouth-piece. It is a good bit for active service and suits the various types of hands in the army. It is equally useful for driving and riding.

The most suitable curb-bit for driving is the Liverpool. (Plate facing p. 81.) This has three positions for the reins; on a level with the mouth-piece when attached to the ring; half-way down the cheek-piece bar; and at the bottom of the bar. As already explained, light hands will be able to handle any horse in a snaffle, or very mild Weymouth or Liverpool. Most other bits and all severe bits expose lack of knowledge, or of horsemanship, on the part of those that use them.

Fineness of mouth is defined as meaning a mouth that is properly trained, and responds to the actions of the bridle hand; therefore the rider cannot be too cautious in the manner in which he uses his bit-reins, or too careful that the movements of his hands are the correct indications of his own will, always bearing in mind that fineness of mouth is not produced through bruising or hurting the bars of the mouth, as the delicate skin which covers them is never so tender or sensitive after abrasion as before.

In choosing a bit we must consider the shape of the tongue and the mouth, the thickness of the skin on the bars, and the conformation of the head, neck and fore-quarters. To determine the width, a wooden rule can be passed through the mouth over the inter-dental spaces. A bit slightly too wide can be used with circular leather cheek-pieces put on the mouth-pieces inside the branches.

India-rubber bits are not recommended for common use. There are times when a horse's mouth may be sore from cutting tushes, etc., when it is advisable to put a piece of rubber round the bit, tied with thread. With one-sided mouths, covering one-half of the mouth-piece may do good.

The cheek-pieces or branches of a bit are divided into the upper branch (above the mouth-pieces) and the lower branch (below), The severity of a curb-bit depends on the relative lengths of the upper and lower branches. The length of the upper cannot vary very much, because it is essential that the curb-chain rest in the chin-groove when the curb is in action; and if the upper branch were too long, the attachment of the curb-chain would be too high. So the severity of the bit should depend chiefly on the length of the lower branch, and never on the tightness of the curb-chain.

Mouth-pieces are either plain or have a port. The depth of port varies from ½ in. to 2 or more inches. The function of the port is that, with the normal position of the bit, the tongue, by pressing on the mouth-piece (the port is lying flat on the mouth-piece), keeps the latter off the more delicate bars of the mouth. When the curb-rein is taut, the mouth-piece of the bit rotates 45° in the mouth, and this allows the tongue to fit into the port, thus permitting the ends of the mouth-piece (on either side of the port) to come in contact with the bars of the mouth. The deeper the port the more the mouth-piece will press on to the bars of the mouth. A moderate port is recommended for most horses; a severe port never.

The bars of the mouth are the ridges in betweeen the molars and the tushes, or the incisor teeth, and are covered with a delicate skin; the space in between these teeth is known as the interdental space.

Cold Bits.—It is cruel to put a very cold bit into a horse's

Martingales.—Martingales would scarcely ever be needed if all horses were properly schooled. They are, *however, occasionally* useful on horses that have the habit of *continually throwing up their* heads, and others who carry their heads excessively high. Light hands and careful handling may cure such habits without a martingale.

A standing martingale is attached to the girth under the chest and to the back of the nose-band. It should be of such a length as to catch the horse on the nose when he gets it up nearly to a horizontal position.

A running martingale is branched, and on the end of each branch there is a ring through which a rein passes. With a double bridle, the bit-reins must be used on the martingale. This type is used for horses that carry their heads too high. Leather stops should be used to prevent the rings catching on the buckles of the reins. A third type has the branches of the martingale strap attached direct to the bit; this is dangerous and is not recommended.

ON DRAUGHT

The theory of draught is not understood to the extent it should be, considering the high percentage of horses that are used in this work. Mechanics tells us much that will help us. In determining the load that a horse can draw we must consider three factors: the force and the method of its applications; the vehicle and the weight carried thereon; and the track on which the vehicle is to move. The first refers to the horse and harness. Economically and humanely we must aim at getting the most work out of the horse with the least exertion on its part: i.e. with the least waste of energy. This is the principle on which all engines are made, but not so with many horse vehicles.

A horse in drawing a load throws his weight forward, and then temporarily removes the support under his fore-portion, thus allow-

ing the weight of his body to be supported by his hind-legs, which will be in compression; the traces of the vehicle being in tension. The weight of the body primarily moves the vehicle. Added to this is the muscular effort of the hind-limbs, and later the fore-limbs, to advance the body forward. So this effort is such that a horse can exert a power very much greater than his own weight. A horse weighing 1,500 lb. can draw on a smooth road a load up to ten tons.

Let us consider how the traces should be attached. It has been stated that 50 per cent. of the power of draught horses is wasted through lack of knowledge of the theory and practice of draught.

The load that a horse can pull, i.e. the resistance that he can offer to a load, depends on (1) his own weight; (2) his grip upon the road, i.e. resistance between his feet and the road; (3) his length and height, i.e. the lengths of the levers acting on the load; (4) direction of the trace, i.e. direction of acting force; and (5) his muscular strength.

Without going into details, it can be stated that the study of mechanics reveals that a horse when pulling a load in a horizontal direction requires the traces as near to a horizontal position as possible. This is modified by the fact that a slight upward pull on the part of the horse (with traces attached lower on the vehicle than the position of attachment to the collar) increases his friction on the ground, and also conforms more to the natural slope of the shoulder. We see, therefore, that a shoulder that slopes too much on a harness horse is not an advantage. There would also be a tendency for the collar to slip up if the rear attachment of the traces was too high. Therefore, the trace should be attached to the vehicle at a height a few inches below the level of the attachment to the collar.

Another point: If the rear end of the trace is near the ground, the horse is exerting an excessive lifting effort on the trace, which means loss of energy. This will also bring extra strain on the fore-legs, and the sooner will these become worn out. With very low traces, too, there is the tendency for the collar to be drawn down on to the horse's neck.

I find these theories to be proved in practice. In places where coal is hauled in the winter in sledges, to which the traces are attached near the ground, the horses show a marked increase in the wear to their fore-legs. The lowering of the back end of the trace increases the resistance between the horse and the ground, but this is only necessary to a small extent, as the horse's weight and his shoeing afford sufficient resistance to slipping.

In the case of light vehicles, however, these modifications are not necessary, and the traces can be almost horizontal.

Traces should tend to work the collar slightly upwards rather than downwards; the throat of the collar must be large. The trouble caused by having the trace attachment so low on heavy sleighs can easily be eliminated by having a steel bracket bolted on to the front of the sleigh, to which is attached the back end of the shafts and the traces; this, when necessary, can be raised two or more feet. There is no reason, except as a matter of economy, for having the heavy merchandise sleighs lower than wheeled vehicles, because most loading now is done from raised platforms. Sleigh-bodies of the same height as the wheeled vehicles would facilitate the handling of merchandise, coal sacks, etc.

Weight and Balance.—The conditions of draught are altered in going up or down hill. In going up a steep hill, more resistance is necessary between the horse and the road. This is attained, to a certain degree, by the lowering of the rear end of the traces, owing to the vehicle being lower than the horse. Roads must afford extra footing on a steep hill. In many places bricks are laid so that the horse can get the toes of his shoes into the grooves. The resistance can also be increased by the driver sitting on the horse's back. If a cart is so loaded that the horse is just unable to move it on a steep hill, it will be able to proceed up the hill if the driver gets on to the horse's back.

Another means of increasing the grip of the horse is to use a two-wheeled vehicle and to place the load well forward, so that more weight bears on the shafts and the horse's back.

The two-wheeled vehicle, indeed, is the ideal one for use with heavy loads on hills, up or down. In draught, the load should be as close to the horse as possible, and this condition is fulfilled entirely by the two-wheeled tip-cart. The hansom-cab driver used to stand up and lean forward to help his horse when going up a hill, and lean back when going down. In the tip-cart, a careful driver puts part of his load right forward when going up a hill, and right back when going down. It is an important point, and if practised generally in hilly country it not only greatly assists the horse, but economizes in fatigue and time. If the horse still has difficulty with the load on a hill, it is better that the driver should ride well forward on the cart, than that he should get off and walk. It may sound paradoxical, but it is a fact. In like manner, going down hill he should sit on the back of the cart.

In loading two-wheeled vehicles for level roads, the load should be distributed so that there is only a slight weight upon the horse's back, just enough to keep the shafts down and no more. The weight should never be increased at the back sufficiently to tip the shafts up, and tend to lift the horse while going down hill, because this may make it difficult for him to hold his grip on the road.

The Pole.—The pole, or tongue, of a pair-horse vehicle should either be held rigid, as in heavy carriages and vans, or suspended by a strong spring that keeps it horizontal. The weight of the pole should not be taken on the collar or neck-strap. Sore necks and fistulous withers are commonly caused by the weight of the pole being borne by the horse's neck.

Anatomy of the Shoulder.—The illustration on p. 98 shows the anatomy of the horse's shoulder, and the common seats of injury caused by collars and breast-harness. The motion of the shoulder when in motion requires careful study. When the fore-arm is drawn forward by the antea spinatus, the flexor brachii and other muscles, the shoulder-blade (scapula) pivots as if fastened a third down its median line. Approximately, then, if the lower end of this bone moves forward two inches, the top edge moves back one inch. This was considered in the section on saddle-fitting. In collar-fitting we are concerned chiefly with the front edge of the shoulder-blade. As one shoulder goes forward, the other goes back; they oscillate alternately. Only when the horse is standing still, with both feet level, and for a very brief period in each stride, is the collar resting on a plane. Most of the time it bears unevenly on the shoulders. Hence the importance of having a soft, well-padded collar. It is, therefore, clear that the tension on the traces oscillates if the traces are fixed rigidly to the vehicle. (*See* Whiffle-trees, page 121).

It is this motion that causes most collar-galls and makes the fitting of collars so difficult. It is essential to keep the shoulders well groomed and in hard condition. A horse that has been out of draught work for some time, must be brought back into it gradually, or else he will become galled or get sore shoulders. As long as the muscles are hard and the bones well covered, the danger of injury is much reduced.

Collars.—The harness collar is stuffed with unthreshed rye straw. It should be lined with leather or thick flannel. The former is preferable. (*See* illustration on p. 98.)

The fit of the collar is important: if pressed to one side it should allow for a finger being passed between it and the shoulder all the way down. On no account must it pinch the shoulder, nor be large enough to allow lateral rocking. If too long it will tend to rise too high, yet it must be long enough to allow the hand to pass in between the throat of the collar and the horse's breast. The horse cannot pull if the collar is pressing on its gullet or windpipe. The neck, or top, of the collar must admit the hand above the neck of the horse.

With vehicles where the weight of the pole is taken on the collar, there is a tendency to cause rubbing or galling on the neck. The best preventive is the use of a zinc (not tinned-iron) arch or wither pad inside the neck of the collar. The metallic zinc acts as an astringent. The horse's mane should not be hogged under the collar; the stiff bristles often cause trouble by being pressed into the crest. The long hair acts as a cushion.

The collar must be firmly pressed against each shoulder to ascertain that the afterwale is clear of the horse. If not, the body must be restuffed. An old collar becomes flattened, causing the afterwale to rub the shoulder. A large collar-body allows for greater distribution of the weight in pulling.

Felt pads and padded cloths, called sweat-pads, are often used inside a larger size collar with much success on farms and on long treks. A shoulder that is very oblique tends to cause the collar to work up. It is essential to keep the linings of collars quite clean and quite soft, with saddle soap if of leather, and by good drying and brushing if of flannel.

New collars are a great source of collar injury and must be carefully examined daily. After being properly fitted, they must be used gradually until worked well in. A good practice is to soak the collar in cold water for a few hours, use it on the horse in light work for an hour, and then allow it to dry out. A collar should be closed all round. Some of the work-collars used on heavy horses are broken at the top and buckled with a strap, which allows of their being more easily put on to the horse. The disadvantage of the opening is that it damages the throat of the collar. This type must be kept buckled up when not in use to prevent loss of shape.

The hames should be fitted to the collar by being bent to conform with the shape of the outside of the collar. If this is not done, the collar will be pressed unduly in some places. A straight hame would tend to press in the centre of a broad collar; and a hame too curved would not be in contact with the collar at its centre. Wooden hames should be steamed and bent, metal hames can easily be bent with a hammer on an anvil or other hard object.

The traces should be fastened to the hames a little more than two-thirds down the collar.

Every horse should have its own collar, marked with his name or a number. In large stables the collars are hung up behind each stall. Borrowing of collars should never be allowed. If a horse gets thin, the collar must be restuffed, or pads used. The pad must cover the whole of the inside of the collar body.

Breast-Collars.—Breast-collars, or breast-straps, are used a great deal in light harness, and in all draught work in the army. If properly fitted they are far better for artillery and active service work, as injuries are extremely rare. The bearing surface is generally leather, which must be kept quite clean and very soft by being occasionally dubbined. Three-ply leather, with a little dubbin inside, should be used around the shoulders. Some heavier breast-straps are lined with felt, and these require special care in keeping clean. They are kept in place by a supporting strap which passes over the neck in front of the withers. If the breast-strap is too high, it will cut into the gullet at the breast, and if too low, it will injure the shoulder, and interfere with the motion of the arm. If the strap is more than two inches broad, a groove should be made in the top at the centre, in front of the gullet.

As the shoulders oscillate there is considerable motion of the breast-strap, and it is essential that it be kept soft and clean, and that the traces be fastened to a whiffle-tree (q.v.).

In army harness a zinc wither-pad is used, over which two straps pass, one to support the breast-strap, the other partly to support the pole (no pole-chains are used).

Collar Injuries and Sore Shoulders.—Collar injuries, unlike saddle-galls, are nearly always caused by friction; except, in particular, those caused by pressure on the crest of the neck. This latter is similar to a deep-seated saddle-gall. (*See* page 109.) Down-hill work and holding back the load with the crest of the neck will cause this. The zinc arch, or wither-pad, previously mentioned, is a good remedy. By stuffing the collar so that it will ride well on the shoulder-blades and very little on the neck, this wither danger with some horses can be greatly reduced. The pole should not bear on the collar. (*See* page 118.)

A tight collar usually causes a friction injury high up on the shoulder; a loose collar, one low down. In such cases, altering the stuffing may remedy the defect, or it may be necessary to fit another collar.

If it is absolutely necessary to work a horse that has a collar-gall, a felt pad must be put inside a larger collar, with a hole cut in the felt; or the stuffing can be removed from the part of the collar over the injury, as explained with saddles. (*See* page 110.)

The treatment of collar-galls and the removal of their cause is almost identical with that given for saddle-galls. (*See* page 109.)

If a neck-gall is very bad, the horse can be worked in a breast-strap for a while, care being taken that the neck-supporting strap is kept clear of the gall. The shoulder and neck must be carefully examined whenever the collar is removed; the fingers being carefully passed over the whole area. Roughness or dirt on the collar must be looked for and removed.

Shoulders that are slightly sore and show a few small lumps should be rested for an hour, and the following lotion rubbed gently in for a few minutes:

Common alum (powdered) . .	2 oz., or	60 gms.
Tannic acid	1½ oz., or	45 gms.
Carbolic acid (pure) . . .	1 dr., or	4 gms.
Water	1 pint, or	600 c.c.

This lotion should be stocked ready. The horse can be worked after an hour.

Harness may cause various injuries besides collar-galls. Girth-galls are common with shaft harness; their cause and cure are similar to those of the saddle-girth-gall. The back-pad will gall if allowed to rock, hence the importance of having the back-band to slide through the back-pad. The crupper may cause a sore under the tail, especially in the fly season; it must be kept soft, not be too thick, and fit well. Croup sores will occur if the hip- and loin-straps are too tight. There must be no lumps, thread knots or rough stitches in contact with the horse. Care must be taken that the breeching and traces do not rub the thighs. In such cases a piece of sheepskin (with hair next to horse) should be sewn on.

Whiffle-tree.—The attachment of the trace is of great importance. As a rule in pair-horse carriages and many commercial vehicles, the rear end of the traces is attached to fixed studs on the splinter-bar. This allows no play and is contrary to sound mechanics and efficiency. We have already seen that the shoulder-blades oscillate alternately, and therefore the collar oscillates also, which causes the traces to do likewise. Now, if the rear ends are rigid, the traces must become alternately tight and loose as the horse walks or trots. It is absolutely essential, if economy and common sense are to be considered, that the rear end of the traces be fastened on to a swinging whiffle-tree. On all American light vehicles, and on many heavy ones also, and on all farm carts, whiffle-trees are fitted. The tree swings parallel to the transverse line of action of the shoulders, thus keeping an even tension on both traces all the time. If one sits behind a horse driven in a whiffle-tree vehicle, it is easy to see the continuous oscillation of the tree, and to realize how wrong it is to fix the traces rigidly to the splinter-bar.

It is a simple matter to attach a neat whiffle-tree to the splinter-bar of any vehicle. This is even more important with breast harness.

With heavy loads, pair-horse vehicles should, in addition, have a set of double trees, that is an evener connecting both whiffle-trees, so that the tension on the traces of the two horses is kept constant. Thus, one horse cannot do more work than the other.

Pair-hauling is, therefore, much more economical and less fatiguing than tandem-draught. When working four horses abreast, as is general when ploughing or reaping on the American continent, a special set of eveners is used. The centre evener is bolted at its middle to the vehicle; to the ends of this are bolted the eveners behind the pair of horses on one or other side of the pole. Thus, all four horses have to do their share of the work. This is a much more economical way of using power than the English or Continental system of harnessing horses or mules one in front of the other, up to four or more.

Loads.—A horse has been known to draw 50 tons on a level railway, and I have known a draught horse weighing 1,600 lb. to draw 16 tons a short distance in a level yard. But normally a horse should not be expected to pull much more than its own weight on bad roads, and twice its weight on good roads. Two horses that work well together as a pair can generally manage a proportionately larger load. Overloading (*see* page 91) is cruel, and poor economy.

One might wonder how a horse when walking can move so large a load with, at times, the muscles of only one leg; but we must remember that the greatest effort is required to start the load, to overcome the moment of inertia; and to do this the horse uses generally all four legs. Once the moment of inertia is overcome it takes very little to keep the load moving; its momentum keeps it going if the horse temporarily ceases to pull.

Harnessing.—Care must be taken that every part of the harness fits the horse properly, that every buckle is properly done up, and no loose strap-ends tucked under that would cause injury.

A horse must be harnessed quietly and never roughly treated; especially is this necessary in putting on the crupper, in bitting, or putting on the bridle and in girthing-up. No time is ever saved by becoming impatient and abusing the horse; if he is so treated he will be much more difficult to harness the next time. A horse never minds being harnessed if properly treated from the first.

It is common to see horses harnessed in too far back in the shafts, so that they almost rub the dashboard. There is no sense in this. Nor should a horse be harnessed in too far forward. With a tip- or dump-cart a horse must never be harnessed in too far back; this might injure the tail. There is no danger of this if the horse is harnessed in correctly.

When approaching a horse in the stall previous to harnessing, warn him that you are approaching him; do not poke your hand out at him or throw the harness on to his back.

After the harness has been put on to a young horse he should be driven about with the long reins or lunging reins, or even led about until he is quite accustomed and reconciled to it, before he is harnessed to a vehicle. It is a good plan always to put on a kicking-strap the first time. Then, should he feel like raising his hind-quarters (perhaps in fun), he will learn at once that he cannot do it; if, however, he was able to do this, he would learn rather a bad trick, of which later he might make use. It is better to get a horse used to wheels before putting him into a sleigh.

THE HARNESS

Breeching.—Breeching is necessary with heavy vehicles, but is not generally necessary with very light ones. It must be remembered that a horse can hold back far more weight on the crest of his neck than he can with the breeching. The breeching should be horizontal and loose enough to allow the width of the hand between it and the thigh. Breeching should fit twelve to fifteen inches below the root of the tail. The loin straps and hip straps that support the breeching should not be tight when the horse is in draught.

Carriage-horse pairs do not wear breeching. With heavy draught pairs breeching is necessary and it is often attached by an under-strap direct to the neck-yolk, so that the breeching takes most of the weight in backing. (Plate facing p. 96 .)

Three-ply leather for breeching answers very well, especially for army work.

Crupper.—The crupper must be well padded and fit properly under the tail. The crupper strap must not be too tight, but allow two fingers to pass between it and the horse's croup. With heavy draft the crupper is not necessary but, if used, one side should be fastened with a small buckle.

Traces.—The traces must be of equal length and attached to a whiffle-tree at the back end. The traces of the lead horses in a team must allow four feet from nose to tail. With shafts, the length of the traces should keep the points of the shafts about on a level with the hames. The hames (of harness collars) must lie evenly in the grooves, and not be buckled up too tightly so as to pinch the collar. The free ends of the hames straps on a pair should point inwards.

Back-Pad.—The back-pad, or harness saddle, must fit like a saddle (q.v.) and be clear of the withers. The back-band should be continuous through the back-pad, and be able to slide from side to side when the horse is in motion. On cheap harness the back-bands are separate and are riveted on each side to the back-pad. The loops on the back-band, through which the shafts pass, are called tugs. The back-pad is kept in place by the girth that should fit like a saddle girth. (*See* page 106.) The belly-band, that is attached to the back-band, must be a little looser than the girth. On one side it is usual to twist this once around the shaft behind the stop.

Breast-Cloths.—Breast-cloths, or breast-pads, are used in very cold countries to prevent the horse's breath condensing on the breast. This is particularly necessary when the horse has a long coat. When these pads are not used it is quite common to see horses with their breasts covered with thick ice. On long trips this is liable to cause so much reduction in temperature as to produce pneumonia. These breast-pads are buckled below the collar. They also afford valuable protection when a horse is sweated a bit, and left standing in very cold weather for a few minutes.

Blinkers.—Any part of the harness that is unnecessary should be discarded, and when it is an appendage that deprives the horse of the proper use of his senses, and generally does not improve his looks, there is still more reason for discarding it. Like so many other things in connexion with horses, blinkers have been used for so many years that most people think they are an indispensable part of the horse's harness. They are not. On account of their general use, young horses are first trained (or should I say broken?) to harness in blinkers (or blinders). Consequently, horses get used to them and shy, or go awkwardly, at first without them. There is no sound reason why the use of them should not be discontinued. To say that a horse will shy at the turning wheels behind is nonsense. Any horse can be trained to drive without them in a few days. Anyone who declares to the contrary is exposing his lack of experience and knowledge on the subject. Army horses never wear them, and we never hear of trouble. Railway companies' horses do not wear them, and on the American continent, harness without them is quite common.

If horses were first trained with open bridles, not only would they go as well but they would go much better, because they would be able to use their eyes and see; and, as we learnt in Chapter II, a horse must be able to see the object that frightens it. Nothing looks nicer than a horse's eye exposed; it is one of the most beautiful parts of his anatomy. A horse with an open bridle can see danger and avoid it. In driving a tandem through crowded thoroughfares I always use an open bridle on the leader (*see* Plate facing p. 80), so that the horse can keep clear of bad motor-drivers and other dangers. Unfortunately, it is necessary to use blinkers on the wheeler to keep the leader's reins away from his eyes. Railway and other commercial companies gave them up so that their horses could see about them in the railway yards and steer clear of danger.

Their continued use undoubtedly is due to custom, and to some people thinking that they improve the look of a horse—how can they?

However, when blinkers are used, it is essential that proper attention be paid to their fit. On no account must they touch, or be close to, the eye. They should be quite rigid, and be at least an inch from the eye. It is so common to see dilapidated blinkers on a horse, which rub the eye, or even hit the eye when the horse is in motion. There is no excuse for this cruelty. It would be wiser to cut them off, if it is a question of expense in keeping them in good repair.

Bits.—Bits and bitting were dealt with earlier in this Chapter. (*See* page 111.) The snaffle bit and a Liverpool are the best kind to drive a horse in. Bad hands and bad training are responsible for the numerous severe bits we see so much in use. I have not yet found the horse that had been driven in such bits, as being very hard mouthed or a bad puller, that would not go perfectly in a light Liverpool in a few days. It takes two to pull; and no horse pulls for the love of it.

Halters.—A secure halter is most necessary. If a horse should get loose in the stable he may land into grave trouble. If a horse once slips his collar he has learnt an objectionable habit. Halters must be strong and the throat-lash must be done up tighter than on a riding or driving bridle; as the horse's jaw is not flexed in it, there is no danger of pinching his larynx.

A non-slipping halter can be made by having the throat-lash detached from the crown-piece on top of the head-stall, so that it passes over the neck a few inches behind the poll. Another method is to use a cow-collar, or broad neck-strap, that goes around the neck close to the head; it is impossible for the horse to slip this over his head. A ring is fastened under the neck. (*See* page 98.) Great care must be taken, however, that the strap on the throat-lash is not too tight; it must allow at least of two fingers being passed easily inside.

A white brow-band adds greatly to the look of a halter, and keeps it from slipping back on the mane.

Training Gear.—Some horse-breakers use absurd and elaborate apparatus for breaking a horse. The modern method of training a horse was described in Chapter III, and all the apparatus that is necessary referred to. Whether the horse is to be for harness, saddle, or for both, his early training is the same. There are a few additional lessons to be taught the harness horse, such as wearing the crupper, allowing the rein under the tail (*see* page 90), and these have already been described. The dumb jockey is, at the best, a poor substitute for a pair of good hands. Any form of elastic or springs is the wrong means of getting a light mouth.

Care of Saddlery and Harness.—(*See* Stable Impurities, page 212.) All harness must be kept clean and soft, to prevent injury to the horse from caked dirt or stiffness, and to prolong its life. Good leather—and there is none to compare with good English leather—will last a lifetime if it is properly cleaned and dressed periodically.

It is also essential that it be stored in a dry place; that it never be closed up in air-tight boxes if it is at all damp; and that it never be hung near the ceiling where coal-gas is burned; nor exposed indefinitely to the fumes of an ill-ventilated stable. Ammonia destroys leather. Saddle soap and grease protect it from ammonia, etc. Dampness deteriorates it.

The inside of the harness, which includes saddlery, must be kept scrupulously free from dandruff, hairs, sweat, etc.; it should not be scraped with a knife, as this damages the leather surface, but rubbed well with a sponge and water. Only if leather is very dirty and greasy should lukewarm water be used. It must never be soaked in warm water, and never be washed with hot water, which destroys its vitality; it should be sponged off with cold water.

After the leather is thoroughly clean inside and out, it should be allowed nearly to dry and rubbed with a cloth; then good saddle soap (Propert's is excellent) should be applied with a damp sponge and rubbed well in. After using lukewarm water greater care must be taken in applying plenty of saddle soap.

Black harness is treated with harness composition (Harris's is excellent) in a similar way, on the outside. The under-parts should be done with saddle soap. Dressings containing a high percentage of methylated spirit must never be used, as they ruin leather. Saddle soap should not be put on too thickly; but it should be well rubbed in.

All leather-work should be given a thorough dressing of neatsfoot oil, or other suitable grease, at least once a year. This should be well rubbed in on both sides. On thin saddle flaps and straps of best bridle leather, the oil should be applied on one side only, and that very lightly. The so-called "pigskin" of hunting seats seldom needs more than good saddle soap. Thick leather should be left oiled, as above, for a couple of days, to allow it to soak well in.

Leather must never be put or stored near a fire, or in a hot cupboard.

Blankets and numnahs must be dried out in the sun, and brushed quite clean. Ammonia solution may be necessary to get rid of sweat spots. Particular attention must be paid to the inside of collars, saddles, girths, cruppers, breast-collars and breeching.

Soft soap must never be used on leather: it contains soda.

Leather and other parts of harness cannot be properly cleaned except with vigour. Half-hearted measures only waste time and do the harness little good.

Steelwork should be lightly oiled before being put away, and rubbed over with bath-brick and burnished whenever it becomes rusty. Nickel and white metal composition are best cleaned with Brasso or paste.

Bits sewn on to the bridle should not be continuously dipped into water, as this tends to rot the leather where it is sewn on.

Dipping highly burnished steel into water will not cause it to rust, provided it is well dried afterwards.

White brow-bands, after pipeclaying, must be well rubbed in the hand to make them quite soft. White girths, similarly, must be made quite flexible; they are liable to rot.

Saddlery and harness must be hung up on suitable pegs and racks. The bars of the saddle-tree should bear the weight of the saddle and not the seat. Saddles and back-pads must never be thrown on the floor: trees are easily broken, and may cause much harm to the horse if undetected.

Harness and saddlery are best kept in a harness-room fitted with glass-door cupboards.

Before putting leather away in store it should be quite clean and quite dry; then it should be dressed with neatsfoot oil. Metal-lined boxes are best; leather that is quite dry, and dressed lightly with oil, will keep in perfect condition for years in such boxes.

Moths.—Moths cause serious destruction to clothing, horse-clothing, flannel linings of saddles, numnahs, etc. This destruction can be prevented with a little trouble. Firstly, it is essential to have the cupboard or box free of moth eggs. Moths crawl behind wall-paper and into cracks and breed there. Carbon disulphide (CS_2), which is highly inflammable and has a very heavy vapour with a disagreeable odour, is the surest cure. A saucer, or basin, containing this liquid should be put near the top of the cupboard or box; the latter is then sealed up for 72 hours. The heavy fumes penetrate into the cracks. Beware of opening the cupboard or box near any lights; the mixture is explosive, but very rapidly disperses.

In large rooms more thorough disinfecting should be resorted to by putting one pound of potassium permanganate ($K_2 Mn_2 O_8$) into a large bucket on a wide tray, and pouring on quickly one pound

Photo: Haas, New York

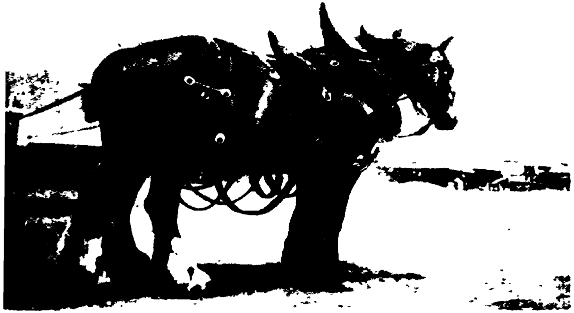
SADDLE-HORSE : NORMA

Photo: Haas, New York

SADDLE-HORSE : SCEPTRE

TRACE-HIGH CLIPPING

THOROUGHBRED : DEMI STROME



TAIL PLAITING

TAIL PLAITING

of formalin. The poisonous gases are given off immediately, and it is necessary to hold one's breath and leave the room as speedily as possible. All windows should have been sealed along the edges with paper and paste beforehand; after closing the door the edges should be pasted over. The room should be left closed for 72 hours. If a gas mask is available it should be used.

These are the only sure methods of killing the egg, or the grub, of the clothes moth.

Preparations should be used to prevent the moth getting into any cupboard or box which contains any wool. The best is naphtha flakes; moth-balls are practically the same and have a less disagreeable smell; camphor is good, but very much more expensive. Oil of cedar is also excellent. These drugs, though, will not kill the moth, nor the grub or egg; but they will keep the moth out.

Further, all wool of any kind should be taken out on a fine, sunny, late May day and shaken and aired and put back. If any moth is seen on the wing, have those articles from which it came treated in a box with the carbon disulphide. The moth is on the wing in the spring, therefore articles exposed to the sun in the spring should become free of moths. If a moth is shut up in a box it might have laid eggs therein, and it is the grub, not the moth, that eats wool and destroys our clothes, hence the carbon precaution.

CLOTHING

Clothing for riding should be quiet in style, of practical shape, and fit well. It is essential that nothing loud or vulgar be worn. Breeches must fit perfectly at the knee and in the leg, and be cut to fit in the saddle, not on foot. The thigh and seat must allow for mounting and comfort while riding. Few tailors, other than breeches tailors, can make riding-breeches to fit well. The leather strappings of breeches should be cleaned with cloth-ball every few days. They must not be cleaned with petrol.

Riding-boots, or leggings and boots, must be made to fit, particularly in the leg. One cannot have freedom of leg movement if one's boots do not fit properly. Riding-boots should have soft or semi-soft legs. The Hill legging is the best.

Gloves, if worn, should be only thick enough to keep the hands warm, so as to allow as perfect a feel as possible. For show jumping they are better discarded. In wet weather, for hunting, string gloves are the best. In very cold climates, two or three pairs can be worn. An inner pair of chamois, and an outer of wool, keep the hands very warm.

Hints on Cleaning Clothes.—Ordinary serges and tweeds are best cleaned by being sponged over with a warm, very weak, solution of ammonia (a dozen drops of Scrubb's or other household ammonia in a teacupful of water), and then sponged over with clean water. Steam-cleaning and pressing of clothes takes the vitality out of the cloth. Soft water should be used if available.

Ammonia and stable fumes should be kept away from scarlet or pink coats; ammonia will turn them black.

To clean a pink hunting-coat, wash with—or even in—lukewarm rain or distilled water, and pure castile soap. Soda or washing soaps should never be used. Do not wring out, but hang up on a coat-hook to drip, and squeeze out the surplus water. When nearly dry, brush over thoroughly with scarlet fluid (Propert's).

A scarlet tunic is treated in the same way; but unless the gold lace is taken off it should not be immersed in the water, but hung over it and brushed down.

Any bare patches, caused by rubbing, or former abuse with strong chemicals, can be covered over with a paste made from vermilion powder and water; when dry it is brushed out.

Never wash white bedford cords in soda, or with soap containing soda; it will turn them khaki colour.

Bedford cord breeches, of any colour, should be scrubbed with soft water and castile soap, and left hung up to dry. They should be gently stretched several times while drying, to prevent the thighs shortening. The material will always shrink a little around the leg, which will re-tighten their fit in the calf.

The leather buckskin strappings of breeches should be well scrubbed with lukewarm water and a flat toothbrush, and while wet the cloth-ball paste applied and well rubbed in with the same brush. Drab ball is the best preparation (Propert's). Red or other strong colours should not be used, as they will mark the saddlery.

The black strappings of blue pantaloons should be first well rubbed with a piece of dry pumice; then the black cloth-ball should be used as previously stated, but without scrubbing with the water.

When dry, the strappings are beaten and well brushed out.

The yellow or red stripes of pantaloons and overalls are cleaned first with soft water and castile soap, and when nearly dry treated with the yellow or red cloth-ball.

BEARING-REINS

As in the case of blinkers, the use of bearing-reins is mostly due to a custom. They have been used so much that people are apt to think they are necessary parts of a horse's harness. They are not. They are, as a rule, useless and detrimental. They are certainly no help to a good horseman; and in the manner they are so often used are positively detrimental.

Like so much else connected with horses, they were introduced for a definite purpose—to prevent a horse, when left standing, from getting his head down sufficiently low to tread on his reins. That is their use and their sole use.

I have yet to find the horse that will not go better, after a few days' proper handling, without a bearing-rein. Owners have often declared that a certain horse could not be driven without a bearing-rein, and it has always proved either that they have not the knowledge or the hands to drive properly, or that they have been entirely in the hands of their coachmen, who have found it less trouble to drive with the head well up by mechanical means.

A horseman uses his hands to mouth a horse and drive it; a heavy-handed driver finds a bearing-rein helpful to him.

The important point to remember, as we learnt when studying draught, is that a horse when pulling must be able to get his head down. How far he puts it down depends on the load, and it is put yet farther down in going uphill. A bearing-rein, except when used merely to prevent a horse getting his head down and stepping on his reins when standing, interferes with the lowering of the head and so prevents the horse from putting his weight into the collar.

Thousands of horse-power are lost by the use of the bearing-rein and hame-rein (on heavy cart horses), by the horses not being allowed to lower their heads as, mechanics teach us, is essential. For economical, as well as humane reasons, then, the bearing-rein should never be used. I thoroughly endorse the work of the Anti-Bearing-Rein Association. Their excellent work has caused this useless article to become nearly extinct in England.

Bearing-reins are used largely on light commercial horses on the American continent; but it is very rarely they are fixed in any way tightly.

Great cruelty was common in connexion with private carriage horses a few years ago; the gag type of bearing-rein then extensively used was the worst of all. Its use implied the grossest lack of knowledge of horses on the part of those that drove behind them.

The best turn-outs never have bearing-reins. The drivers prefer the public to think they are good and capable at their job.

The excuse made by the ill-informed that bearing-reins prevent stumbling will bear very little investigation. Whenever a tightly-checked horse falls or stumbles, he is unable to recover himself unless the bearing-rein breaks. Mechanics supply the reason: when the horse stumbles, he unconsciously throws his head down to recover his balance; if he cannot, then he falls. This always happens if the bearing-rein does not break.

I remember being on escort many years ago when the off-wheel horse reared up, and he was so tightly checked that he fell over backwards and caused a nasty accident; solely the fault of the stupid coachman.

Bearing-reins will never make a horse carry his head higher, except when actually in position and forcing it up by mechanical means; nor will they prevent a horse getting his nose into his chest. A horseman can cure either of these faults in a very short time.

John Wesley, the Evangelist, rode thousands of miles on horseback. He used to buy horses that stumbled because they were cheaper. He cured them by riding with a loose rein, and always sold them at a much higher figure.

By the bearing-rein is meant the side-reins that hook on to the back-pad, and on each side pass through loops near the horse's ears and down to the bit. In the gag bearing-rein, they pass through the side-loops near the ears, down through the rings on the bit, and up again to the sides of the head-stall; thus giving double leverage on the horse's mouth.

The overhead check-rein is attached to the back-pad and to the top of the head-collar at the poll, or it may pass over the poll and down the face, bifurcating and being fastened on each side to a small bit in the mouth.

The overhead check was invented for use on the trotting-horse race-track. Personally, I believe from experience that a horse will trot just as well without his head being checked up high and his nose stuck forward. But, granted that they are of use on the track, their advantage ends there. One always sees these reins unhooked the moment a race is over, and never hooked up until just before a race.

There is, therefore, no excuse whatever for using these checks on horses in the street. They reveal bad horsemanship or lack of knowledge. This check was introduced some years ago into England, but those who adopted it were prosecuted by the R.S.P.C.A., and its use very rightly ceased forthwith. In the early 'twenties a major was fined at Southampton £20 for driving his mare with a tight check-rein.

Harness-makers should know better than to add such impedimenta to their harness.

The hame-rein consists of a short rein, similar to a short riding-rein, that is hooked up on the back-pad. These are used on heavy draught horses. If fixed so as to prevent the horse getting his head down to the ground their use may be justified; but if they prevent the horse getting his head down when pulling, so that the poll is as low as, or lower than, the withers, their use is both brutal, wasteful and senseless. In Scotland the hame-rein is nearly extinct. A horse cannot pull his full load unless he can lower his head and put his weight into the collar.

Strained backs are very common with horses on which the hame-rein is abused.

Nothing looks more graceful than a free neck well arched, and nothing looks more uncomfortable as well as unsightly, than the horse with his neck held rigidly in an unnatural position, tugging and worrying all the time. Any form of check prevents that free and graceful movement which appeals so to a horse-lover. Bearing-reins interfere with breathing, distress the horse and cause him to fret, and ruin the temper of a nervous animal. Bearing-reins, and particularly the overhead check-rein, are responsible for many diseases. The more common are parotitis, pharyngitis, laryngitis, various diseases of the œsophagus and trachea, of the tongue, teeth and lips, injuries to the gums, roaring, poll-evil, fistulous withers, sores under the tail, disorders of the brain, cerebro-spinal meningitis, etc.

A book published in London some years ago contained the names of nearly a thousand veterinary surgeons who denounced the use of bearing-reins, except very loosely, as previously explained, and described the many diseases and evils which arose from the use of tight or moderately tight bearing-reins or checks.

Such great authorities as Dr. Fleming, Prof. Axe, Prof. Rutherford, and the leading veterinary and medical journals, have openly condemned their use, as being cruel, injurious and useless.

The Times and many of the leading papers in England and the United States have denounced the use of bearing-reins, especially the terribly cruel exhibitions one used to witness outside theatres, when the tortured horses were waiting for their knowledgeless owners. So bad did this practice become some years ago that the Duke of Westminster issued an appeal to London carriage owners to make their coachmen loosen their bearing-reins.

Fashion, and nothing else, was responsible for this abominable cruelty, that, happily, has now passed.

ON PHOTOGRAPHING HORSES

Successful horse photographing is not an easy accomplishment. We see many photographs of horses that do neither credit to the animal nor the photographer. The photographer has much to keep his eye on; the legs, ears, tail, etc.

It is essential that the horse is standing well balanced on all four legs and that each leg is showing from the camera. When there are no flies about the task will be considerably easier. Preparations to keep flies away are therefore necessary, if a good photograph is to be procured in places where the flies are bad. Flies are worst at the end of the fly season.

The ears must be pricked forward. This cannot be attained by the man on the horse, or in the vehicle behind the horse, chirping to the horse. Such action will cause the horse to turn his ears back to catch the sound; that is what the ears are for. The rider or driver must not make a sound, and keep quite still.

An assistant should stand in front with a sieve or bowl of oats and shake it. He should never throw up his hat, or wave a handkerchief, as this will startle the horse. We want him to become interested in something in front of him. He will then look at it and prick his ears towards it. Another horse may be useful to secure this attention.

The Camera.—The height of the camera is of importance. The reflex or hand camera that is held at the waist, is too low, it gives the horse a leggy appearance. Such cameras should be used with the operator standing on a chair or box. The lens of the camera should be about level with the chin of an ordinary man, say at a height of five feet, to get the best results. That is to say, level with or just below the top of the horse's back.

Press cameras are the best for the purpose, because a horse often moves, which makes a stand camera quite unsuitable. The reflex and the wire aperture-sight Ernemann cameras are the most successful at the work.

CHAPTER VI

FEEDING AND WATERING

STABLE **Economy.**—Every owner of a horse is responsible for its proper feeding. It is too common, in this so-called enlightened age, to find horses underfed; there is no excuse whatever for not feeding a horse sufficient food, but there often is sufficient excuse for feeding a horse improperly. The science of feeding is understood only by the minority; it is a study of which no horse-owner can afford to remain ignorant, yet the majority have very small knowledge of it. There is no economy in underfeeding, and the law should have no mercy on those who practise it.

In this chapter we will study the correct feeding of horses. No two horses can be kept absolutely fit on exactly the same feeding. The expert horsemaster can make any horse that is not constitutionally ill, look well by careful feeding. A good stableman who understands feeding is worth much to his employer. Indifferent horsemasters throw the same feed into the mangers day after day without any consideration as to whether the horse is being overfed, underfed, or wrongly fed. The horse was created for motion and he must have exercise; his food must vary according to his exercise. The quantity and quality must be regulated. Overfeeding with insufficient exercise will do much harm. It causes an over-exuberance of spirits, and may even cause a lame horse to forget his pains sufficiently to do himself a deal of harm. On the other hand, we do not suggest that a horse that is feeling too fresh should be starved, which is what Henry VII ordered before he rode a certain horse that was too much for him. A horse in that state should be fed on hay and bran and very little grain, and exercised by someone else first.

All horses in one stable should be fed at the same time; otherwise those that are left unfed will become restive and acquire such bad habits as pawing, kicking, etc. Regularity in feeding-hours is essential if horses are to look fit. The best of clean food and clean mangers and utensils are just as necessary.

FEEDING AND WATERING

In approaching the horse to feed him, let him know you are coming; say "Steady," or something like that. The hay should be fed from low racks (overhead racks cause the dust to get into the eyes), and the grain from mangers that can be cleaned easily. Hay should be put into the manger with the hands; the less the pitchfork is used near a horse the better; when used it must be handled with great care. Any accidents or injuries, or signs of sickness or abnormal feeding, must be reported at once. Laziness is responsible for a great number of neglected horses. A lazy man around a horse, or in charge of horses, should be got out of the way as soon as possible. A lazy man cannot be a good horsemaster. A good horsemaster is always unselfish. On account of a horse's love for company he always keeps better when stabled with another.

The Digestive Organs.—Let us consider the way the animal system obtains its nourishment from foodstuffs. Health is the ordinary condition of the body when all the organs are working normally. Disease is an abnormal state. It is essential for us to let the horse live under as natural conditions as possible.

The animal body consists of water, nitrogenous matter, carbo-hydrates, fat and mineral salts. Water forms about three-fifths of the weight of the body. This varies under different conditions, and decreases in old age. The mineral matter forms about one-twentieth of the weight and is found chiefly in the bones, with a little in the muscles and blood. The water, salts and mineral acids are known as inorganic substances; the remainder are organic, comprising nitrogenous (protein, albuminoids and simple nitrogen bodies), and non-nitrogenous (fats, carbo-hydrates and organic acids, as lactic acid).

The most important organic substances are protein, carbo-hydrates and fat. The animal system is composed of countless minute cells, varying from 1–300th to 1–3000th of an inch in diameter. A cell consists of protoplasm, a nucleus and a centrosome. Animal tissue grows by the duplication of cells. A cell splits into two, and each of these new ones grows and again divides. The protoplasm forms the greater part of the cell, and consists of protein and water. None of the phenomena of life occurs without the presence of protein. It is a complex carbo-hydrate. The cells are kept alive by blood supply; the blood is their food. The food in the intestines, after digestion, is passed, by a process known as osmosis, through the cells of the intestinal walls into the blood and lymph-streams. Through the blood and lymph-vessels it is carried all over the body. Some of this food is retained by the liver in the form of glycogen, which is given out again when required.

The alimentary canal is the long tube, lined with mucous membrane and various glands, that extends from the lips of the mouth to the end of the intestines. It consists of the mouth, pharynx, œsophagus (gullet), stomach, small intestines (duodenum, two feet; jejunum, thirty feet; ileum, forty feet), cæcum, or blind gut (three feet), large intestine, or colon (twelve feet), floating colon (ten feet), and rectum (two feet). Large glands (salivary glands, liver and pancreas), and small glands (in the walls of the stomach and small intestines) supply the digestive juices for the food.

In prehension, the horse takes the food into his mouth by means of his lips and teeth, passes it with the tongue to the molars, which grind it and allow the ptyalin from the sub-maxillary glands to act on the food. Its chief action is the conversion of starches into sugar ($C_6H_{10}O_5 + H_2O = C_6H_{12}O_6$). Hence the importance of having the teeth examined every six months to see that they are functioning properly. The fluid from the parotid gland moistens the food. The above process is insalivation. In deglutition the horse swallows the food, which is mixed with the pepsin and hydrochloric acid in the stomach, and the second stage of digestion takes place. It then passes into the small intestines and is mixed with the pancreatin (pancreas) and bile (liver) and goes through the third and last stage. In the large intestines absorption of the "food" takes place, the refuse eventually being collected in the rectum and passed out at will.

The Principles of Feeding.—The horse's stomach is very small, of a capacity from 2 to 4 gallons, whilst his intestines hold from 45 to 50 gallons. The ox, in comparison, has a stomach capacity of 60 gallons, and of intestines only 25 gallons. Further, the horse, unlike man and the ox, has no gall-bladder; the bile flows continuously from the liver into the small intestines (duodenum). The horse's digestion is, therefore, continuous. The horse in nature spent most of his time eating; a horse undisturbed has been known to graze for 22 hours in a day. The principle in feeding a horse is, then, small feeds and often. A horse eats only 5 lb. of hay in an hour, and mixes this with four times its weight of saliva. The food passes out of the stomach in the same order as it enters, and it does not remain long in the stomach; it could not during a regular meal, because this furnishes more than one stomachful of food and saliva. Less than a gallon of oats when mixed with the saliva will fill the stomach; if the horse is then fed with 5 to 7 lb. of hay, in less than an hour he will have forced all the oats out of his stomach. As oats take longer to be acted upon by the gastric juices than hay, because the former contain four times as much nitrogenous matter as the latter, it is essential that the oats remain in the stomach as long as possible. It is therefore necessary to feed the hay before feeding oats, or at any rate sufficiently previously to allow the horse to eat most of his hay first, if we want the full value to be derived from the oats.

The laws of digestion for the horse are, in other respects, the same as for man; it is, therefore, essential that after a heavy meal the horse be given ample rest to allow for proper digestion. One hour should be allowed after finishing grain before it is put to hard work.

When digestion is proceeding normally there is a large supply of blood in the intestines, and we should not call upon the muscles to do severe work, as this will check the intestinal functions of digestion.

The appetite is a fair indicator of the kind and amount of food required by the stomach. In the domesticated state, the horse's appetite will over-indicate as regards such palatable and concentrated foods as oats, and we therefore here resort to other means for ascertaining the amount properly required. When the system needs nourishment the stimulus produced excites the whole digestive tract to action, which prepares itself for the reception of the food.

When a horse is very sick, no good will result from stimulating this action by offering palatable food; but when he is convalescent then we must do this. When sick, the easiest digested foods, such as bran mashes, etc., must be given. Grain or green fodder should never be fed to an overheated or overtired horse.

Severe work lowers the activity of the appetite and the powers of digestion, and special feeding has to be resorted to with overtired horses, or else acute indigestion will follow. When a horse is off its feed it should never be forced to eat much; he must be given plenty of good water and small quantities of palatable and easily-digested food. It is essential that everything be done to make the horse eat slowly. This will economize in feed, and the horse will derive greater benefit. If there is not time for a horse to eat its normal feed, it must be given a smaller one, and fed the rest later on. If a horse misses one meal, on no account should he be fed a double feed at the next meal; this would cause serious stomach and intestinal trouble; but he should be given the other meal four hours after the usual evening feed.

A horse should be allowed one and a half hours for his meal if possible. While feeding his hay he can be rubbed down, but should be left alone to eat his grain in peace.

Very severe work, as racing, should not be given for several hours after a full grain feed. The pressure of the distended intestines and stomach may rupture the diaphragm; at any rate, it will hinder proper lung action.

Water should always be given before the feed, unless there is water before the horse all the time. (*See* page 161.)

No opportunity should be lost for grazing a horse or letting him pick at suitable food. The horse is better if there is always some food in his stomach.

In commercial stables " chop" is often fed, both in the stable and from the nosebag during the day at work. Often no long hay is given at all. The " chop" consists of hay chaff, oats, maize, etc., the grain generally being split.

The system of putting a large ration before a horse is wasteful and injurious. Where chop is fed in big stables, it is generally the custom to give fresh supplies whenever the mangers are cleaned up.

Four to five pounds of oats is the maximum feed for a hunter or light draught horse. A gallon of good oats weighs 5 lb. If the stomach is overloaded the food will ferment and produce gases that will cause various troubles.

Mangers must be kept scrupulously clean and sweet smelling. As previously stated, hay should never be fed from overhead racks, as the seeds and dust get into the eyes and mane. All crevices and corners must be kept clean. With thin horses it is much more important to feed small quantities often.

The amount of grain must be regulated by the work. Closest observation of such details, and also of each horse's peculiarities and health, is essential. Much can be learned from the condition of the dung and urine. (*See* page 271.)

The largest feed of grain should be given in the evening, when the horse can digest it properly at ease.

A horse doing heavy, slow work, can get a large amount of hay and less oats in proportion; a race-horse, on the other hand, gets an abnormal amount of oats for his size, and a lesser amount of hay. Some race-horses in training only get 7 lb. of hay a day.

FEEDING AND WATERING

Bulk is essential in all feeding, otherwise it is found that the digestive organs cannot function properly. Bulk in the food is the cure for much indigestion, and in choosing food we always consider the proportion of bulk it contains. However high may be the nutrient properties of a food, without bulk a horse can never be kept in good condition. A horse weighing about 1,200 lb., or about the size of a middle-weight hunter or officer's charger, requires 25 to 30 lb. of bulk a day. A heavy draught horse (1,800 lb.) will require up to 40 lb. or more of bulk a day.

Our cavalry horses in one winter during the Great War were greatly distressed owing to shortage of hay (bulk). They suffered from a permanent sensation of unsatisfied hunger, and various troubles followed, such as wind-sucking, eating filth, weaving and indigestion.

The best method of feeding is to give a small amount of hay in the morning (1 to 2 lb.) while the horse is being quartered, then feed less than one-third of the grain; at noon, feed a third of the hay and a third of the grain; at evening stables, a little hay and remainder of the grain; and the remainder of the hay late at night (8 or 9 o'clock).

If the oat ration is large (over 12 lb.), it should be given in four feeds.

Some advocate feeding oats always with chaff; yet some horses never eat chaff and keep very fit. Certainly, if a horse passes grain whole, chaff or bran will generally prevent greedy bolting. Large stones in the mangers, or a flat, large manger, will prevent bolting. Special mangers with a series of cups moulded in the bottom are made, which prevent some horses bolting their grain.

Hot feeds should be fed at least once a week at night, and on the night before the horse's day of rest, which he should have every week. Boiled oats are most beneficial; these should be mixed with an equal volume of bran and allowed to cook together. (*See* page 148.) Salt must be added to all hot feeds. After a hard day's hunting hot gruel should be given. Hot feeds may not be necessary during warm weather. To be in real hunting condition, the horse must have plenty to eat and plenty of work.

Horses thrive best in a limestone country; the water and the pastures are ideal for all horses. This is more necessary for light horses.

There should always be plenty of salt before the horse; it increases his thirst, tends to rid worms, and purifies the blood.

Before a horse is taken out to work, care must be taken that he has eaten up his last meal properly. If he has not, he must be examined to see if he is sick.

Economy must be studied; avoid dropping hay and other forage about the stable. Sweep up clean bits. When feeding in the open in a wind, use a hay-net or a nosebag.

Horses that scour when at work are not generally affected by a change of food; it is usually a nervous affection, the absorbing powers of the large intestines becoming temporarily partially paralysed. Horses with broken wind (emphysema) must have their hay always wetted; if possible, with lime-water. Horses that have suffered from founder should not be fed heating food, such as beans, but be fed light on oats and given regular, moderate exercise.

SPECIAL FEEDING

During the Great War, when horsemastership of the highest quality was essential to keep horses fit on the smallest possible rations, the following procedure was found most beneficial:

5.30 a.m. ..	1 lb. hay. 1 lb. green food.
7.30 a.m. ..	Water. 3 lb. oats. 1 lb. hay chaff.
Noon.	Water. 3 lb. oats. 1 lb. chaff.
2 p.m... ..	2 lb. hay. 4 lb. green food.
4.30 p.m. ..	Water. 2 lb. oats. 1 lb. chaff.
8 p.m... ..	Water. 2 lb. oats. 1 lb. chaff.
9 p.m... ..	3 lb. hay. 5 lb. green food.

At 8 p.m. we fed "stodge" as well; this consisted of bread, bully-beef, sugar, and anything the horses would eat, added to the hay seeds that were collected on large sheets when the hay was shaken out; salt was added to this. Horses got to love "stodge." Other points were: Slow eaters together; bullies and fat horses by themselves. All hay and green fodder fed from hay-nets, except the chaff. Look for worms. Examine the teeth. Get all horses to lie down as much as possible. Do not worry the horses. Dampen the chaff. The green fodder was obtained locally by foraging parties.

Race-horses.—The morning Galtee More (The Triple Crowner) won the Derby, he had half a feed of plain oats early before he went out; a feed and a half when he came in. Two double handfuls damped, three hours before the race, preceded by twenty swallows of water. The race is run at about 3 o'clock.

Van Horses.—One large horse-owning London firm feed their horses, averaging 1,100 lb.: oats 10 lb.; maize 6 lb.: hay 15 lb.; total 31 lb. dry matter.

25 lb. per 1,000 lb. weight is a fair guide.

Another firm keeping 700 horses, feed 32 lb. dry matter; of this 16 lb. is hay, fed all chopped; the rest is oats, chopped maize, cooked beans and linseed oil.

One large London omnibus company fed their horses that averaged 1,200 lb.: maize 16 lb.; oats 1½ lb.; peas 1½ lb.; chopped hay 12 lb.; total 31 lb.

Farm Horses.—For saving in the winter two to three pounds of grain a day, and also saving buying bran, the following is adopted: Equal parts hay or clover chopped; 4 lb. oats; 2 to 3 lb. of crushed maize, and a few chopped roots, making a total of 25 lb. of dry food per 1,000 lb. of weight. Give one boiled feed a week at night—Saturday preferred. Failing this latter, give sulphur or nitre. The feeding of roots must not be overdone on account of their great bulk and the smallness of the horse's stomach.

Fleming advocated for a heavy farm horse (1,800 lb.): 18 lb. oats; 2 lb. beans; 18 lb. hay; 2 lb. straw chaff; total 40 lb. Of this about 30 lb. are digestible. A horse can work for long hours at slow work. Never overload, and save feed and horseflesh.

Alternative rations suggested for farm horses at average work per 1,000 lb. live weight, are suggested:

Oats 6 lb. hay 15 lb.; lucerne hay 6 lb.; wheet-straw 1 lb.=28 lb.
Oats 9 lb. hay 6 lb.; clover hay 6 lb.; wheet-straw 2 lb.=23 lb.
Oats 7 lb. maize 3 lb.; hay 5 lb.; oat straw 5 lb.; beans 2 lb.=22 lb.
Potatoes 8 lb.; carrots 6 lb.; hay 10 lb.; clover hay 3 lb.; straw 2 lb.; maize 2 lb.; beans 2 lb.=33 lb.

For horses at heavy work per 1,000 lb. live weight:

Oats 18 lb.; hay 6 lb.; straw 3 lb.; beans 2 lb.=29 lb.
Oats 5 lb.; maize 8 lb.; hay 8 lb.; clover hay 6 lb.; nut cake 2 lb.=29 lb.
Oats 8 lb.; rye 4 lb.; hay 8 lb.; lucerne hay 6 lb.; linseed meal 1 lb.; nut cake 1 lb.=28 lb.

The amount of oats may vary from 3 to 18 lb. per 1,000 lb. live weight, according to the age and work. It is not advisable to feed more than 20 lb. of hay and straw per 1,000 lb.

Young Hunters.—Young hunters should be given good pasturage during the day, and put into separate loose-boxes at night. A small feed of oats and bran and a little hay should be given at night. This can be repeated with advantage in the morning. Young hunters should be kept on the big side.

Feeding after Foaling.—(*See also* Chapter XII.) After foaling the mare has to be given sufficient nourishment for herself and her foal. Any drugs given to her will also act on the foal. The foal should be allowed to nibble its mother's grain from the first; oats are, therefore, better crushed. Boiled oats should be given every night. Linseed meal should be added to the grain.

A foal must be well fed; he should attain half of his adult weight when he is a year old. Alfalfa and turnips are excellent food.

During the first winter, a good daily ration is: Alfalfa (lucerne) 5 lb.; meadow hay 5 lb.; 1 oat sheaf; turnips 2 lb.

Causes of Thinness.—Owners, grooms, officers of mounted units and the men must take a personal interest in their horses, and have a genuine love for them, if the animals are to look really well-cared-for.

If a horse is thin and looks unthrifty, a careful investigation must be made. Does he get his proper feed? Is he regularly fed? Is he watered sufficiently and regularly? Does he bolt his food? Do other horses steal it? Are his teeth all right? Is his tongue sore? Has he worms? Are his droppings and urine all right? Are his temperature and pulse normal? Is the food clean and good in quality? Is the groom a bully, or is the rider or driver unsuited for the horse? Nervousness is responsible for much fretting and thinness, a good quiet man will quieten such a horse and get flesh on. Does he lie down at night? Is he being properly exercised and groomed? These are the points that the horsemaster must look into.

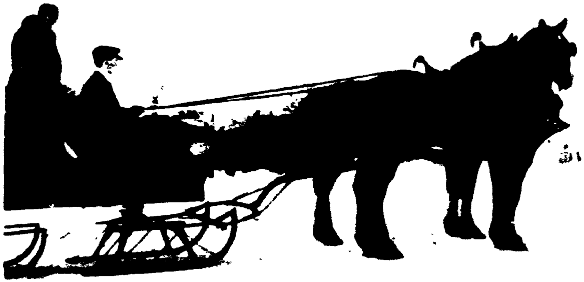
Nosebags.--(*See also* page 73.) In Europe nosebags are commonly used for the midday meal of work horses; and used considerably for feeding during any part of the day when halted, with horses that are fed on chop. They must be roomy enough to allow the horse to breathe comfortably. Feeding from a box on a stand is more comfortable, but there is more danger of wastage of the grain. Nosebags must be kept clean, dry and sweet smelling. Some of those that are used are too close-fitting, unventilated, filthy and too heavy; a horse should have something to rest the bottom of the bag on. They should not be buckled up too tightly.

Storage of Forage.—Rats and mice devour and damage a great amount of valuable grain. Every precaution must be taken to keep oats free of vermin. Grain is best stored in large metal-lined bins with lids. These should be quite dry. Large quantities

TEAM OF PERCHERONS

CARRIAGE AND PAIR (HACKNEYS)

TAIL PLAITING : LIGHT HORSE



PAIR OF BLACKS

TAIL PLAITING : HEAVY HORSE

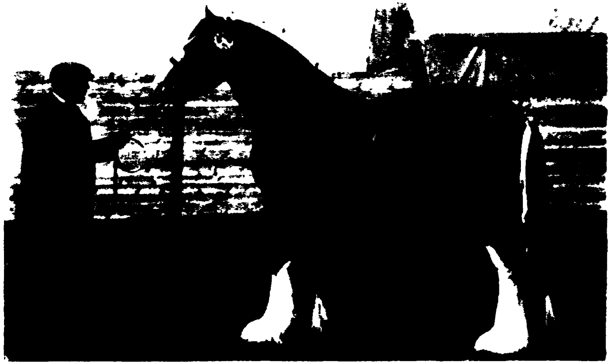


Photo: G. H. Parsons

CLYDESDALE : BONNIE BUCHLYVIE

of grain in sacks should be continually turned over to allow for airing and to discover any rats or mice.

Good cats will generally keep mice away from a forage store, and, if not fed too well, should keep rats away, too. Care must be taken that the cats can get access to the grounds outside, so that they will not foul the forage. The best rat poison to use in places infested with rats is arsenious oxide. A big flat dish of hot meat stew should be placed in the evening, in the centre of the place infested; powdered arsenic should be freely sprinkled all over the meat. The rats will come in droves and devour the meat. They will go outside to get water and die there.

Rat virus is safer than poison, and, if used as directed on the tins, will rid rats from large areas. The Liverpool Virus and Azoa (Parke Davis) are very reliable products and cost very little.

Hay and unthreshed oats should be kept in stacks, well thatched with wheat-straw.

FOODS AND THEIR VALUES

Forage: Composition of Food.—A healthy and suitable food must contain: (1) the proper amount and proportion of the various proximate principles; (2) those adapted to climate, age and work done; (3) the proximate principles must be in a digestible form. The nutritive value of diet depends greatly upon the amount of carbon and nitrogen contained in it, and also the amount of indigestible fibre.

During exercise an enormous amount of carbon is secreted by the lungs as carbon dioxide; nitrogen is secreted as urea in the urine. The perspiratory glands of the skin secrete various elements. About ten times more carbon than nitrogen is secreted. The composition of the food given must bear some ratio to the elements secreted. Protein contains three and a half times as much carbon as nitrogen; the extra carbon required will be derived from the fats and carbo-hydrates. Vegetable food contains an excess of carbo-hydrates (sugars and starch).

Cooking serves a useful purpose, so far as horses are concerned, under abnormal conditions. It breaks up the starch grains, bursting the cellulose, and allows the digestive juices to come in contact more readily with the starches, forming glucose or grape sugar ($C_6 H_{12} O_6$).

Vegetable foodstuffs contain: water, nitrogenous matter (protein), soluble carbo-hydrates, fat, woody fibre (indigestible fibre) and ash (mineral salts).

These are classed as follows: flesh making (protein), fat—heat producing (starches, sugars and fat), bone producing (mineral salts), woody fibre and water. The starches and sugars are the carbo-hydrates.

Food	*Water*	*Mineral Salts*	*Protein*	*Fibre*	*Carbo-Hydrates*	*Fats*	*Digestibility*
Meadow hay, average.	14·3	6·2	9·7	26·3	41·4	2·5	62%
Red clover hay, average	16·0	5·3	12·3	26·0	38·2	2·2	61%
Rye grass hay	14·3	6·5	10·2	30·2	36·1	2·7	55%
Sainfoin hay	16·7	6·2	13·3	27·1	34·2	2·5	63%
Lucerne hay (Alfalfa)	16·0	6·2	14·4	33·0	27·9	2·5	62%
Vetch hay	16·7	8·3	14·2	25·5	32·8	2·5	60%
Pasture grass, average	80·0	2·0	3·5	4·0	9·7	0·8	92%
do. rich meadow	78·2	2·2	4·5	4·0	10·1	1·0	93%
Red clover	80·4	1·3	3·0	5·8	8·0	0·6	91%
Lucerne (Alfalfa)	74·0	2·0	4·5	9·5	9·2	0·8	87%
Vetches	82·0	1·8	3·5	5·5	6·6	0·6	91%
Turnips	91·0	0·7	1·1	0·8	6·3	0·1	99%
Mangels	88·0	0·8	1·1	0·9	9·1	0·1	99%
Swedes	87·0	1·0	1·3	1·1	9·5	0·1	98%
Sugar beet	81·5	0·7	1·0	1·3	15·4	0·1	99%
Carrots	85·0	0·9	1·4	1·7	10·8	0·2	97%
Parsnips	88·3	0·7	1·6	1·0	10·2	0·2	97%
Potatoes	75·0	0·9	2·1	1·1	20·7	0·2	97%
Oat-straw	14·3	4·0	4·0	39·4	36·3	2·0	56%
Wheat-straw	14·3	4·8	3·0	42·0	34·9	1·3	48%
Bean-straw	16·0	4·6	10·2	34·0	34·2	1·0	55%
Oats	12·1	3·3	10·7	10·6	58·3	5·0	73%
Barley	14·0	2·7	10·0	4·9	66·1	2·3	83%
Wheat	14·0	1·7	12·0	3·0	67·3	2·0	90%
Rye	14·0	1·8	11·0	3·5	67·4	2·0	90%
Maize (Corn)	12·7	1·6	10·1	2·3	68·6	4·7	89%
Wheat bran	13·0	5·6	13·6	8·9	54·9	3·4	76%
Rice meal	10·5	9·9	12·0	10·0	45·6	12·0	75%
Beans	14·4	3·2	25·0	6·9	48·9	1·6	84%
Peas	14·4	2·7	22·6	5·4	53·0	1·9	86%
Linseed	12·3	3·4	20·5	7·2	10·6	37·0	86%
Linseed cake	11·8	7·3	28·7	9·4	32·1	10·7	76%
Palm-nut cake	12·0	3·7	19·0	10·0	48·3	7·0	73%
Apples	84·8	0·5	0·4	1·5	12·5	0·3	96%

Digestive values may be expressed in the starch equivalent and in calories:

	Starch equivalent per 100 lb.	*Calories per 100 lb.*
Meadow hay	30	513
Rye grass seeds	27	461
Oats	58	1,000
Maize	77	1,321

But the value of a food should not be based so much on the caloric value as on the amount of glucose the liver will eventually be able to derive from it, and depends on the amount of albuminoids and carbo-hydrates it contains.

As a horse increases in fat, the rate of increase per unit of fat eaten decreases.

The submaxillary gland, which supplies the ptyalin to convert the starches into sugar, and the parotid gland, which moistens the dry food, are both very large in the horse, on account of the large amount of dry food given him since domestication.

The suitability of a food is ascertained by observation. A wholesome food is not necessarily a suitable one. The state of the fæces is a valuable guide. (*See* page 271.) The action of the bowels is likewise affected by the food.

The longer the waste matter is left in the intestines the longer will there be a chance of the poisonous matter being absorbed into the system.

Meat is the most concentrated and most easily assimilable of nitrogenous foods. It is not generally fed to horses; although during the siege of Metz it was; and scraps of salted and other meat were fed in the "stodge" to cavalry horses during the Great War. I remember a drum-horse in one British cavalry regiment that would eat a plate of hot meat and vegetables.

Vitamins.—All food contains certain properties called vitamins. Their presence in a food has a very definite effect on the growth and development of an animal. Many different vitamins have been "discovered" up to the present. Vitamin A and Vitamin B are the two that concern us most with horse foods. All green grasses, vegetables—as cabbage—butter fat, egg yolk, cod liver oil and yellow corn contain an abundance of Vitamin A. Hay also contains A. To get normal growth, Vitamin B is necessary; B is found in cereals (oats) and in yeast. Beri-beri is caused amongst Asiatics who eat polished (huskless) rice. Straw contains none of these essential vitamins. Sileage contains an abundance of A. Mature animals need these vitamins to keep up strength and energy.

The protein value, fat value or mineral value of a food has no connexion with the vitamin content.

Oats.—Practical experience has proved that oats are the most suitable grain for horses. They contain a high percentage of fat and fibre, and are not too high in carbo-hydrates; oats are not too heating. They suit a horse's digestion better than any other grain. The wholesomeness of a food depends much on a fair proportion of fibre; although fibre is mostly indigestible, its presence is necessary to aid in digestion. Foods containing too much nitrogen are more liable to upset the system through the poisonous effect of an excess of nitrogen.

Feeding Oats.—The daily ration per 1,000 lb. live weight is about 10 lb. with moderate work, increased to 12 or 15 lb. with severe work. Horses at very light work require only 6 lb. Horses at rest in a loose-box should only have 1 lb. at the most, this being added to the bran mashes. Oats are generally better fed mixed with bran or a handful of chaff (chopped hay); this prevents a horse passing some of his oats whole. Chaff should be damped before it is fed; and must be well mixed with the oats.

Crushed oats are advantageous for sick horses, young foals or old horses, especially with impaired teeth. Under normal conditions it seems that a horse, while masticating the whole oat, gives more time for the salivary juices to act on the grain. There are many advocates of feeding oats always crushed; but experience and experiments show that the whole oat for a horse in proper health is just as good, and the extra work involved in crushing is saved. If a horse bolts his oats whole, then they should be given crushed. In mixing up chop, the oats should always be crushed. The crushing should only break the kernel and not grind it in any way into flour, or much of the goodness will be lost. Horses suffering from indigestion, or whose digestion is weakened during an illness, should be fed with crushed oats. With hard, small foreign oats, crushing is much more essential. Crushed oats can be made into a mash similarly to bran (*see* Bran Mash, p. 153). Oats can be steamed or boiled. Every horse should have a boiled oat-feed once a week at night, before his day of rest. Boiled oats are specially good for thin horses. They are prepared by boiling in sufficient water to allow for an equal bulk of bran to be added. They should be kept at a simmer for from 4 to 5 hours, stirring frequently. Then the bran and common salt are added; the whole well stirred and left to cook for half an hour. One to two gallons can be given for a feed.

Characteristics of Oats.—Horse-owners and feeders should be able to judge the quality of oats. They should be plump, short, round, hard, dry, floury if bitten, have no bitter taste, contain no dust, be firm to the hand when a handful is squeezed, be without odour; of colour, pale yellow, white or black, and should smell slightly sweet, and rattle in the hand if shaken. Deep yellow signifies that the oats have been kiln-dried. The kernels should bulge through the husks, which must be quite thin and occupy a very small space. The fatter the kernel, the heavier the oat. They should be beardless and of uniform size. Beards decrease the weight of oats. New oats are soft and contain more water, and are therefore heavier. They are not fit to feed to horses. Oats of the previous year are best. They vary in weight from 25 to 50 lb. per bushel; an average is 34 to 40 lb.

In weighing oats, the measure, placed on the scales, should be filled from the sack and the surplus struck off with a round stick, leaving the measure level to the brim.

Good oats should have been cleaned in a fanning machine. White oats have generally less husk. English oats are best, with Canadian oats a close second.

Defects in Oats.—Inferior oats are long, thin, irregular in shape, have thick husks and long beards; dark in colour, strong odour; soft to feel when squeezed, due chiefly to the beards and thick husks.

Oats that are damp become heated. They will darken in colour and have an acrid smell; they are called "foxy" oats. To hide this they are kiln-dried, which removes the "foxy" smell and restores hardness, but turns them nearly brown. To get rid of this they are bleached with sulphur. The sulphur can be tasted if the oats are crushed in the mouth. Oats slightly damaged through damp can be saved entirely by kiln-drying; but oats that have become much damaged are very inferior.

Long-bearded oats are "clipped" in a machine in order to increase their weight.

Mustiness and mouldiness, due to damp harvest or damp storage, can be detected by the odour. Mould should be revealed on examination.

Oats that have begun to sprout are of inferior value. Horses may refuse oats that have been tainted by rats; this can be detected by a keen nose. If a horse refuses his oats, they should be examined carefully and offered to another horse. Give the first one some fresh oats

Measuring Oats.—Oats are sold by the bushel of eight gallons, or by the quarter, or the load. For purposes of sale the bushel is taken at a fixed weight: 32 lb., 40 lb., or other weight. Thus, if the standard bushel is 32 lb., and the oats sold are only 30 lb., the purchaser will receive more bushels than he pays for, and vice versa. The standard bushel contains 2,218·2 cubic inches. It measures 19½ in. in diameter, and 8¼ in. in depth.

Dry measure (by which oats are measured):

4 gills = 1 pint
2 pints = 1 quart
4 quarts (8 pints) = 1 gallon
2 gallons = 1 peck
4 pecks (8 gallons) = 1 bushel
4 bushels = 1 sack
2 sacks (8 bushels) = 1 quarter
5 quarters = 1 load or wey
2 weys = 1 last

Maize.—Maize is known as "corn" in North America and "mealies" in South Africa. It is unsuitable for young live stock, on account of its high starch and sugar and low fibre content, but is good food for hard-working horses. It is much more heating than oats. Maize should be dry, bright in colour, hard, free from dirt, sweet to taste, and have no distinct odour. It is bought by the quarter at 60 lb. to the bushel. The best variety is the Canadian or American corn, which is triangular in shape, large and flat. It is eaten enormously by humans.

Maize soon deteriorates if kept in bulk, and heats if allowed to get damp. When heated it becomes darker, softer, and has a pungent odour. It may become musty or mouldy.

It should be fed mixed with other grains, and should invariably be crushed or split. If fed alone, chaff must be added to it. It is used much in "chop." As it takes longer to digest, water should not be given for two hours after feeding it. Soaking for several hours will make it easier to masticate. Mules are better suited to feed on maize. The daily ration is about the same as oats.

Barley is fed a great deal in some countries. It should be plump, short, hard, with a thin wrinkled husk, of a pale golden colour, and with no distinct odour. It is sold by the quarter at 54 lb. to the bushel. It must be fed crushed, parched or boiled, on account of the indigestibility of the husk. Barley is difficult to crush. It is parched by throwing some together with a little sand heated to red heat, and stirring until the husks are split. The sand is sifted off, reheated, and mixed with other barley.

Rye.—This cereal is a poor food for horses and is unsuitable if fed alone. It is given in some countries coarsely ground and cooked.

It rapidly ferments after cooking. Even small quantities may cause diarrhœa. Ergot fungus is often found in rye.

Wheat.—Wheat is a useful food if no better is available. Horses can be made to do very well on it. It should be fed crushed or parched; and may be mixed with other grain or chaff. It must be dry to be easily digested. The grain is difficult to masticate whole. The dry flour can be fed up to from 2 to 4 lb. a day. The grain can be fed up to 7 lb.

Beans and Peas.—Beans and peas are the most nutritious form of grain for horses; they are high in flesh-producing content. They are, therefore, very heating, and should only be used for hard-working horses, or those exposed to severe cold. They can be fed up to 6 lb. a day to horses at pasture in damp weather; 4 lb. a day is sufficient for hard-working horses. Under ordinary conditions 1 lb. a day. Beans should be hard, dry, light brown in colour, sweet to the taste. They are sold at 64 lb. to the bushel. English beans are best, and are smaller, rounder, plumper and thin-skinned. Beans less than a year old are indigestible; and if very old become dark and deteriorate. They must be fed split, on account of their tough husks. They must be free from weevil.

Peas should be light in colour, hard and sound. They are liable to get wet at harvest, which makes them dark in colour.

Rice.—Rice is fed a great deal in India, but the husks are very indigestible to animals not used to them. It is better crushed or boiled, and should be fed in larger quantities than oats. Without the husk, rice is unsuitable for horses, owing to the lack of fibre.

Cleaning Grain.—All grain, especially oats, should be cleaned, to rid it of dirt, pebbles, nail heads, weed seeds, and other foreign substances. Fanning machines can be purchased very reasonably. Grain may be steamed, or soaked in hot water for an hour; it is good for sick horses.

Compressed rations have to be fed at times on active service. As they do not contain sufficient bulk they are quite unsuitable except as an expediency. They should be well broken up, and are better if soaked and allowed to swell.

Roots.—Roots are a very valuable food for horses, especially in the spring, when they act as an alterative. Roots cool the system, prevent humour, make the coat glossy, and generally benefit the health.

Carrots are the best roots for horses; both red and white are liked by them all. They should be mashed, left whole or cut lengthways—never crossways, as the lumps may lodge in the throat. 4 lb. per diem is not too much for hunters, even at hard work.

Parsnips are next best, but some horses do not like them, although they will generally get to do so. They should be fed similarly to carrots.

Mangels are the next best. Horses are very fond of them. Not much of these should be fed before the New Year.

Swedes are not so good, nor do horses like them so well; they are inclined to be too laxative.

Turnips are not very suitable for horses. But they are often fed chopped up in "chop," or cooked in a mash; especially on farms for heavy horses.

Potatoes are used considerably in Ireland; but they are not recommended if other roots are available. They should be cooked, as raw potatoes are indigestible. Horses can do hard work on boiled potatoes, if they are used to them.

Roots can be chopped up into pieces not bigger than half an inch in diameter, or into long strips, and mixed with grain and chaff, or they can be boiled and fed hot.

The ration for hunters in work is from 2 to 4 lb.; other light horses up to 6 lb.; heavy horses up to 10 lb. per diem. Large roots can be pulped and fed.

Bran.—Bran is the husk of wheat after the kernel has been ground into flour. It owes its nutritive value to the flour left in it. Bran from modern flour mills does not contain much nourishment. It is, however, a very valuable horse food. It aids digestion, increases the bulk, and is mildly laxative. It also contains valuable salts (lime and phosphates). It prevents horses bolting their oats. Its chief value, however, is when it is cooked into a mash. It is very cooling, and acts well when mixed with heating foods such as beans and peas. Bran mashes are laxative; dry bran is slightly constipating with some horses.

Bran must be quite dry, free from lumps, sweet in odour, flaky, and yellowish-red in colour. Damp will quickly turn it sour and lumpy. The colour varies according to the wheat. The hand if plunged in and drawn out should be considerably covered with flour; and if the bran is chewed it should not be gritty or sour. Sand may have been added to increase its weight; this can be tested by throwing a handful into a clean vessel of water. Beware of poisoning from moulds in lumpy bran that has got wet or damp.

Bran is specially suited for young, growing animals. It can be partially substituted for oats with heavy horses and a considerable saving in cost of keep effected.

Bran mash is made by taking 2 or 3 lb. of bran in a bucket, scalding with boiling water, adding 1 oz. common salt, stirring with a clean stick, covering and allowing to cook by its own heat until cool enough to put the clean hand in, then fed. This is sufficient for one horse.

Linseed is one of the most valuable conditioning foods we have, as it contains a high proportion of fat. The grain should be plump and well filled, free from dirt and bright in colour. Its very tough husk prevents it being fed whole. It must be ground, soaked or cooked.

Linseed cake is excellent for horses; it is made from the residue of linseed from which most of the oil has been expressed. It should be fed up to 1 lb. per diem, either broken up, or after being soaked for twelve hours in cold water. If soaked for much longer it will turn sour.

Boiled linseed is made by boiling the whole grain slowly for from six to twelve hours, with repeated stirring, to prevent burning. Or the grain may be soaked in cold water for twenty-four hours stirring frequently. In both cases a jelly will be formed that is relished by horses. It is an excellent food for fattening. Half a pound a day is a suitable ration, fed with other food.

Linseed mash is made by boiling 1½ lb. of linseed in water for eight hours, not too thick in consistency; 2 lb. of bran and 1 oz. common salt are then added and stirred, and the whole covered and the bran allowed to cook until cool enough to bear the clean hand in, then fed. This is a good feed for one horse.

Linseed tea is excellent for soothing mucous membranes and the urinary organs. It is made by boiling 1 lb. of linseed in 1 gallon of water, and allowing to simmer for twelve hours. A teacupful should be put in the feed at night.

Linseed oil (raw) is an excellent substitute for the tea; and should be fed in the feed, 2 oz. per night.

Oatmeal—and other meals such as maize and beans—are used for making hot or cold gruel. Hot oatmeal gruel is made by putting a double handful of oatmeal into a bucket of hot water and stirring. It is excellent for a hunter directly he comes in after a hard day. Cold gruel is most refreshing on very hot days, given in the place of the water on coming in. Gruels should be very thin in consistency. An ounce of salt should be added.

Sugar is an excellent food for fattening, and contains a good proportion of nourishment. It is best fed in the liquid form, as a commercial syrup. This syrup should be diluted by adding a *little boiling water and then making the volume up to two gallons* for every pint of the syrup. This can be given as drinking water, or used in making up boiled oats, mashes, etc. Some of the horses on long-distance rides were fed considerably on molasses. Sugar cane or treacle can be added to the feed, and fed up to 1 or 2 lb. a day. Sugar is fattening and sustaining, and is suitable during exposure to cold. It has a tendency to soften the condition. Molasses are fed with good results in South Africa and India.

Lump sugar should not be given too frequently to horses as a *tit*-bit in the stable. It has a tendency to teach them to lick the manger or wall. If it leads to this habit it is best not to give it in the stall at all; crib-biting may be learnt this way.

Salt is a valuable addition to the ration. Horses love salt, they lick one's hand to get the salt from it. Rock salt, that contains iodine, or a lump of iodized salt, should be used. A lump should always be in every horse's manger.

Salt increases the thirst, purifies the blood, and assists in ridding intestinal worms. Salt increases the disease-resisting power of the blood.

Failing rock salt, an ounce of coarse sodium chloride can be put in the feed once or twice a day. Rock salt must be stored in a dry place: otherwise it will crumble.

Green Food.—The addition of some green food, freshly cut, is of great value in the spring and summer. It should not be fed too suddenly, nor heavily, to a hard-working horse. A few pounds, mixed with the hay, or chopped and mixed with the grain, should be fed daily. Up to 10 lbs. per day can be fed. If it produces scouring the quantity must be reduced. Too much of it will make the horse soft; it is laxative. If fed too suddenly in large quantities it may cause colic through fermentation. Green food must be fed within twenty-four hours of being cut; fermentation sets in rapidly. An idle horse fed entirely on green food requires about 40 lb. per diem. Green food weighs heavy owing to the high water content. Horses must be prevented from gorging themselves on it.

Grazing.—This is most beneficial to any horse, but particularly is it so for hard-working horses that are fed on so much dry food.

Horses enjoy it immensely, and derive the utmost benefit from even half an hour a day. No opportunity should be lost to allow them to graze at the side of the road, or in a field, when halted for a short while. Cavalrymen are always taught to graze at every opportunity. A few mouthfuls quench a horse's thirst and appease the appetite temporarily. The only time it should not be allowed is when the horse is very heated and the grass is wet. Grazing assists in keeping the bowels regular, and in maintaining good health. If possible, every horse should get half an hour a day grazing in the spring. They prefer to graze up-wind and on the level, or slightly uphill. A horse takes at least seven hours to get his fill if receiving no other food.

While a horse is being rested-up after a period of hard work, he should be turned out for several weeks to graze, after his morning grooming and light exercise, until evening stables. This is also excellent for thin horses.

Pasture.—It is most beneficial for any horse to get two weeks at pasture once a year when the grazing is good, but preferably when the flies are not bad. A horse with a docked tail certainly ought not to be turned out during the fly season. Pasture is most beneficial for horses suffering from sore feet, a growing splint, and other tenderness. Great care must be taken that there is a plentiful supply of good water, and that there are no barbed-wire fences which might do damage. A shed should be provided for the horse to enter in bad weather, and some form of shade for the hot days. Flies will not enter a shed tarred black inside. Tiny flies get into horses' ears; they should be sponged out with a creolin-dampened sponge.

The condition of the pasture must be watched. Horses are too often put into scanty pastures; besides being cruel, the horse does not benefit, but comes in in a bad state. Weeds and rushes, however plentiful, are worse than useless. If the condition of horses that are out for only a few weeks is to be maintained, they must be fed half rations of grain every day, half in the morning and half at night. In any case, with poor pastures, oats should be fed once or twice a day. A horse will usually lose weight the first month at pasture if no grain is fed.

Pasture should be kept close and never allowed to grow long or go to seed. Cattle are best pastured with bloodstock, their manure helps. The cattle should be fed on cake. Horse manure does not help pastures. Sheep should not be grazed with horses, because *they eat the centre of the plants. Sheep do a pasture good if put* in alternately with horses.

For Thoroughbred colts, rye grass and timothy are best; clover *is not suitable. The field should be ploughed and one season of oats put in every eight years, or an eighth of the field can be done* each year.

Hay.—Hay varies much in quality, and horse-owners should have a good knowledge of the characteristics of good hay. The value and quality vary according to the grasses and herbage of which it is composed, the time it was cut, the manner it was saved, and the soil on which it was grown. The last is of great importance. Herbage consists of the plants that are not true grasses. Since the introduction of modern farm drainage and irrigation, most hay is "meadow hay," i.e. that grown on suitably drained or irrigated land, and used for hay annually. Hay from very damp fields is distinguished by the presence of water-grasses, rushes and sedges; this is called "water-meadow" hay; the grasses are all coarse.

Hay that is grown from seed sown as a rotation crop is called "ley" hay, and may be cut for two or three years in succession, and then the land used for grain or roots again. Ley hay is known as artificial, hard or seed hay. Timothy hay, clover hay, etc., are those that consist chiefly of these grasses or herbage.

Meadow hay is distinguished by its fineness, the large variety of grasses and its pleasant aroma. It is greener because it is more quickly saved; the fine grasses drying quicker. Seed hay contains a small variety of grasses, which are larger and often contain much herbage.

Characteristics of Hay.—Good hay is greenish-brown in colour; not yellow or dark brown. If cut when wet it looks bleached and becomes mow-burnt. Hay should be moderately hard, brittle, free from woodiness, well saved and about one year old. The stalks should lie more or less together, and not be tangled up; this latter shows excessive turning over in the making. The odour should be sweet, flowering heads abundant, and the colour of flowers should not be washed out. Each specimen of grass should be good. It must be crisp to the feel and sweet to the taste. Good hay contains little dirt.

Hay should be composed of mostly good grasses, few indifferent and practically no inferior. Old hay is from six to eighteen months of age. Hay that is too new is not good to feed. New hay, sold within six months of cutting, is softer, has more colour, tastes sweeter and has more odour. It is more bulky and heavier; a truss weighs 60 lb.; but of old hay only 56 lb. The flower-heads are not faded and the herbage and weeds are not blackened, as in old hay. It does not cut so well into trusses. The hand detects a warm feeling when plunged into it. Hay that has finished sweating and has settled down, is more digestible than the older. Hay one year old should preserve most of its colour. After a year it does not improve by being kept; it becomes less digestible as it gets older.

Saving of Hay.—Hay should be cut when flowering; if cut before, the nutriment is in the stalk; if after, the nutriment is in the seed. By allowing some of the seed to form and fall, the land will be helped. Hay cut too late is distinguishable by the absence of flower-heads and seed; the stems will also be woody. Great care must be taken in saving, drying, carrying and stacking. It is usually raked into windrows, and then into cocks. It may take several days to dry properly in climates like that of England, but in Alberta it is generally stacked the same day it is cut. Sun and wind as well as a dry atmosphere are needed for quick saving. The sooner it is dry, the better for the hay.

Rain destroys hay by washing out most of the nutriment; this is shown by its lack of colour. A large number of trees in a field decrease the value of the hay. Clean ground will contain fewer weeds.

Old hay always contains dust. Baled hay is much more dusty, and must be well shaken out before being fed, to prevent it affecting the wind of the horses. For this reason, baled hay is best dampened with brine, or lime-water in preference. Dust is increased if the hay was much weathered in the making, or the soil very dusty, or if over-exposed to the sun. If hay is stacked before the juicy grass stems are dried sufficiently, fermentation sets in, and the stack may become mow-burnt or even fired. Horses like hay slightly mow-burnt, and it does no harm; but if much affected it tends to cause diabetes (mellitus) and should not be fed. Hay that has been dried and subsequently become wet will turn musty or mouldy. Musty hay is inferior; although some horses will eat it, it is not fit to feed. It may be dark brown or bright yellow, and have a bitter taste. Mould will show in white patches. Mouldy hay must never be fed. A good truss may become mouldy if exposed to damp. Exposure to air will remove a slightly musty odour.

The "nose," or sweet smell, in fairly new hay is due chiefly to the presence of sweet vernal.

In examining hay, several trusses or bales should be opened right through.

Canadian baled hay is sold a great deal in England, and usually contains a high percentage of timothy, which is excellent feeding.

English hay is difficult to equal; the average growth is fourteen million tons per annum.

Hayseeds contain the major part of the nutrition and should be saved and mixed with the oats. Dust must not be swept up with them. Seeds can be soaked overnight, but not longer.

Brine for dampening hay is made by putting four to eight ounces of salt into a gallon of water.

Hay-loft sweepings are not suitable for feeding; they may contain a dangerous amount of rat and mice excreta.

Hay Grasses.—These are divided into useful and useless. The useful grasses are: rye grass; meadow fescue; tall fescue; foxtail; timothy (catstail); crested dogstail; cocksfoot; sweet vernal; rough- and smooth-stalk meadow grass; and yellow oat grass.

The useless grasses are: barren fescue; the bents; false oat; wavy mountain hair grass; field brome; sheep's fescue; slender foxtail; darnel; tufted hair grass; ribbon grass; quaking grass; rib plantain; reed sweet grass; couch grass; barren brome; and wall barley.

Some common weeds are: blackhead; coltsfoot; silver weed; sedges and rushes; dandelions; buttercups; marguerites; and nettles.

Herbage consists of clover; trefoil; vetch; sainfoin and lucerne (alfalfa).

Clover.—The presence of clover in hay increases its value, although much clover should not be fed to young Thoroughbred stock. It is also inclined to be very dusty.

Lucerne (Alfalfa).—High in nitrogen and very nutritious. Mix with other hay for Thoroughbred stock. Two or three crops can be cut during the season. It is perennial, and is a tall, green plant, with a small purple flower. The plant grows like a tiny tree. It roots deeply, and can be grown on dry soils, such as those of India. It thrives best in countries with hot summers. It is brittle, and consequently dusty.

Sainfoin makes an excellent hay. The plant is large, coarse-stemmed, thin-leaved, with a pink flower. Specially suitable for heavy horses. It has a coarse stalk, but is of good value, unless tough. It is very nutritious and liked by horses. Two crops a year may be cut. The plant is only biennial. It should be cut for hay before it flowers.

Gorse should not be fed to young stock. It should be chopped up in a gorse-chopper, or a fine-cut chaff-cutter. Should be cut each day, during October, November and December only. Is a good winter feed for idle horses and should be mixed with equal quantity of hay or straw chaff.

If the Horse is off its Feed.—Ascertain if pulse and temperature, droppings and urine are normal. Examine the teeth; they may be hurting the gums; there may be sharp points or pieces of wood wedged in. Are there any wolf teeth? Is he cutting new teeth? Are the roof of mouth, bars or tongue sore? Has the horse got loose and over-eaten itself? Is the manger clean and sweet-smelling? Is the coat loose and glossy? Is the horse nervous, lonely or over-fatigued? Is his throat sore? Are there rats or mice that upset him? Is the food good?

If horses are to look and be fit, owners and officers must take a personal interest in their horses and have a genuine love for them. Otherwise the grooms will not do their best.

Oculus domini saginat equum.

WATERING

A horse can live but a very short time without water. He must be watered at least three times a day; but as his large intestines, which temporarily store the water, are so large, he can take in a big supply of water at a time. I have seen a horse weighing 1,100 lbs. drink ten gallons at a drink; this is abnormal. Four to six gallons would be an average for a horse on return from work. A stable bucket holds four gallons. Throughout the year the daily consumption for a 1,000-lb. horse is eight to ten gallons.

A horse should be watered late in the evening; especially in the summer, when it should be done at 8 or 9 o'clock. He should always be watered before a meal, as the water is needed in his system to aid digestion. The amount required varies very much; in hot weather, with hard work, a horse may drink fifteen gallons or more a day, whilst in cold weather he may only require four or five. The army allowance, when water is rationed, is ten gallons.

Horses that do not have water before them all the time must not be watered (more than a few mouthfuls) for an hour and a half after feeding grain; or two hours after rice. Water does not remain in the stomach, but passes right through the stomach and small intestines into the large intestines. In doing this it will wash a certain amount of grain through the stomach, if the horse is watered after feeding grain. This will waste the grain, and it will swell in the small intestines and may cause stoppage or other forms of colic.

Horses at grazing must have good water always at hand. It seldom hurts to water a horse when a little warm on return from work; cavalry horses are always watered this way, and keep better for it. Water should never be warm. The chill may be taken off in very cold weather.

One precaution must be taken; if the horse is a little warm when watered, he must be walked about for ten minutes before being put into the stable, to prevent the internal organs being cooled down too suddenly. He will then do far better than if left until cool before being watered. The horse must never be hurried while watering. Some horses drink very slowly and raise their heads several times. The uninitiated often think a horse is finished when he does this, and lead him away. He should be allowed five minutes to drink.

Theory of Watering.—Reaction is readjustment of a disturbance; healthy reaction causes increased functional activity. If the disturbance is too violent or prolonged it will not be readjusted and, in this case, a chill may result. The greater the functional activity before a disturbance or shock, the more easily will the system be able to readjust itself. The sooner, then, a horse is watered on return from work, the better; provided he is not sweating freely, overtired or blown. If a horse is walked the last quarter to half a mile back to the stable, there is little fear of this. The exception would be after a race. And in any case, if the horse is warm, he must be walked after watering, until quite dried off. The water will rapidly be absorbed and he will become cool very much quicker, and will be refreshed.

Water is necessary to keep down the abnormal rise of bodily temperature produced by work—work generates heat. Warm water should therefore not be given to healthy horses. The temperature of the body is kept down by perspiration; the skin becoming damp, the moisture evaporates. Evaporation of a liquid absorbs heat, that is, lowers the surrounding temperature; there-

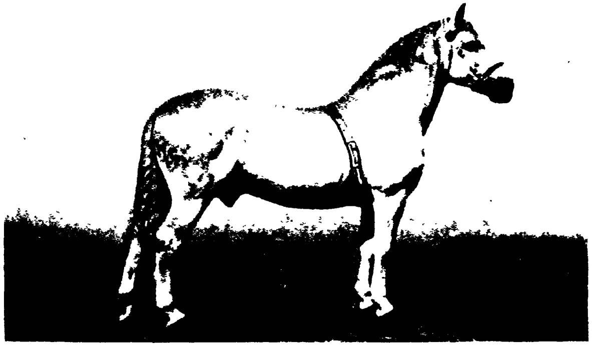


Photo: W. A. Rouch

HACKNEY: FINDON GREY SHALES

GREY PERCHERON

Photo, Farm Life

HACKNEY: PETER SHALES

TAIL PLAITING: HEAVY PAIR

Photo Haas, New York

HACKNEY: KNIGHT COMMANDER

TEAM OF PERCHERONS IN TORONTO

fore the skin cools and in turn cools the body. Work without increased supply of water would upset the horse's system.

When the system is heated, the sooner it is brought to a normal state the better for it physiologically, hence the importance of watering on return from work, provided the above precautions are taken.

Water quenches thirst; it satisfies the horse. Psychologically, then, this system of watering is sound. Water is most valuable in aiding excretion of impurities from the system. On a hot day a horse excretes four to five times as much water through the lungs and skin as he does through the kidneys. Water is required at all times to nourish the system and keep the blood supplied. When it has performed its function it is excreted.

In rheumatism and other systemic diseases elimination of the disease is hastened greatly by the free use of water. Water mechanically aids the intestines to rid useless residue.

Water helps a horse after hard work to recuperate more rapidly. Salt increases the thirst and therefore should always be given to horses.

Before doing fast work a horse must not be allowed to drink more than a few swallows, because the pressure of the large cæcum (where the water is stored until absorbed into the blood) would interfere with the lungs.

The ideal way to water a horse is to have running water before him all the time. Stagnant water in a bucket in the manger, or in the manger itself, must not be allowed. If water is not before a horse continuously, regularity in watering must be insisted upon.

If a heated horse is watered and then left standing in the stable, there is considerable danger of foundering the horse, or giving him colic, enteritis or other disease. Founder (laminitis) is caused in this case by the water driving the blood out of the intestines into the feet. If the precautions previously stated are taken there is no danger of such trouble. Old-fashioned grooms say the cold water causes founder; far from it, the water is necessary to assist the functional activities of the body and a little common sense needs to be applied with it.

If a horse shivers or shakes after watering, he should be walked about briskly for five or ten minutes.

Horses must never be trotted to or from watering, nor watered when they are breathing abnormally. Unless a horse has drunk only a few mouthfuls he must not be trotted for half a mile after drinking. Horses on the march must be watered at every opportunity.

A horse should have his bit taken out before he is watered. Riding a horse bareback into a stream to water him is all right, but a bridoon or watering-snaffle should be used. When a number of horses are being watered together, they must be kept still and quiet until all have finished. A horse cannot take too much water when he is in normal health.

Watering in lakes and rivers with sandy beds may rub off the periople of the walls of the hoofs, and cause the hoofs to become very brittle. Packing the feet, or the application of hoof oil, may be necessary. (*See* Chapter IX.) If the sand is stirred up, the horses may take in sufficient to cause sand-colic.

Water.—Good water is not by any means the clearest. Horses generally prefer cloudy water in a pond or ditch to clear water from the main; the former is softer. The best horse-breeding districts are limestone, and this is chiefly due to the water. Water from a limestone district is, as a matter of fact, fairly hard. Good water must be fresh, pure, tasteless, clean, aerated, fairly clear, colourless, fairly soft and odourless.

Bad water seldom does a horse harm, because he will generally refuse to drink it. Bad water can be filtered through a sand-bed, cinders or charcoal. A tub half-filled with the sand, etc., and with holes in the sides at the bottom, can be stood in a larger vessel, and the water run into the top of the tub.

Very hard water generally leads to a derangement of the intestinal canal; this causes a harsh, staring coat, which will rapidly become normal if the water is changed to soft. Horses may become quite ill on hard water. The addition of lime-water (calcium hydrate) is the best method of softening hard water. The source of the supply of water should always be investigated; the water may come from a contaminated district.

Troughs and Buckets.—Watering buckets must always be clean and should occasionally be scoured out with boiling water or steam; never with creolin. Other watering vessels, troughs, etc. should be similarly treated once a week. In the event of contagious disease, the only antiseptic that will not taint the vessel is corrosive sublimate (mercury perchloride); but as this is poison, the vessel must be well washed out afterwards.

Water-troughs must be high enough to prevent horses pawing their feet into them. There must be no sharp edges or corners;

and they must have cocks so that they can be emptied. They should be wide, and from eight to ten inches deep. With the modern public horse-trough, where there is a constant flow of water, and a continuous outlet from the surface, any foam or mucus left on the surface by a horse rapidly runs through the outlet and very little danger of infection remains.

Public troughs that are not scientifically up-to-date should never be used, and should be condemned and replaced as soon as possible. Public horse-troughs are most essential. Some drivers carry a bucket for watering their horses, and the troughs should have a tap on the side for filling buckets.

If a horse will not drink, ascertain if he is getting his daily salt, if his throat is sore, if he is cold, if the water is all right, if the vessel is clean and free from an objectionable smell, such as creolin, if he can stale normally and if his mouth is normal inside.

CHAPTER VII

GROOMING AND STABLE MANAGEMENT

Fais ce que dois, advienne que pourra.

THE Theory of Grooming.—The functions of the true skin (dermis) are: to act as an organ of touch, to remove poisons from the system, to secrete perspiration and control body temperature, to secrete oil to help the hair and prevent friction on inner parts of joints, and to produce the outer skin (epidermis), including hair, hoof and horn. Perspiration is visible and invisible; the former is generally known as sweat. The latter takes place most of the time, and is very thin, containing about 99 per cent. water. Perspiration is given off by the blood. Free use of water will increase this physiological action and promote good health. The moisture, on reaching the coat, evaporates, the rate of evaporation varying with the dryness of the atmosphere. Heat is required to convert a liquid into a gas, therefore as the perspiration evaporates, heat is absorbed from the adjacent skin, which is cooled. This cools the blood in the superficial vessels, and this again cools the whole system. In hot weather, the more water that is given the more easily is the system prevented from being overheated. Horses cannot stand much damp heat, because the humidity of the atmosphere prevents sufficient evaporation. In a dry atmosphere the skin may appear quite dry, yet evaporation will be much more rapid than in a damp atmosphere, when the skin may feel damp.

Perspiration is regulated by the blood-supply, by the nervous action of the sweat (sudoriferous) glands, by emotion, external heat, muscular exercise, poisons, and by ill-health.

Cold sweat is a sign of ill-health; it is produced when there is insufficient blood-supply in the superficial vessels owing to a nervous derangement; undue cooling is the result.

A hard-worked horse, therefore, must have plenty of water to keep the functions of the skin active. The cleaner the skin the better will it function—hence the necessity for good grooming.

The secretion of the oil and the exfoliation of the outer *part of the* epidermis are accelerated by grooming.

The coat protects the body from injury and keeps it warm. The skin is thickest where it is most likely to be injured, on the limbs and back, and thinnest in between the legs and inside joints. The true skin produces and feeds the outer skin, hoof, and hair. Friction on the outer skin (epidermis) causes the dermis to secrete a fluid in the form of a blister, which is Nature's protection against injury to the dermis, which is full of blood-vessels and nerves. The epidermis consists of layers of cells; fresh layers being continually formed from the dermis, the outer layers drying up and exfoliating, forming dandruff (scurf). Grooming removes this dandruff. The poisons excreted by the sweat-glands are partly absorbed by the dandruff, and its removal rids the coat of such poisons. The true skin also contains little sebaceous glands that secrete a fluid (sebum) into the follicle of each hair. This is necessary for the proper condition of the hair, which should be glossy, soft and smooth. Grooming is essential to stimulate the action of these oil-glands. Scratches or grease in horses is due to these glands at the back of the pastern becoming blocked up with dirt. (*See* page 281.)

The sweat glands (sudoriferous) are deeply seated in the dermis, and are most numerous at the base of the ears, then on the side of the neck, then on the shoulders, then the flanks, and then on the chest.

A horse, therefore, perspires first at the base of the ears.

Perspiration contains salt and poisons from the blood. Healthy perspiration is thin and wets the coat, and does not stand out in globules. Thick perspiration indicates ill-health. Globular beads may show over-exertion or lack of condition. It is easy to sweat a horse by using heavy clothing, but difficult with the use of drugs.

The hair of the horse is of three kinds: temporary, all over the body, shed in spring and autumn; permanent, or "horse-hair," on mane, tail and back of fetlocks; and tactile, or feelers, on the end of the muzzle and around the eyes, which is highly supplied with nerves. The summer coat is much shorter, and usually of a different shade. Grooming assists in removing the old coat when it begins to change. Each hair has a follicle or bulb, a root and a shaft. The latter is hollow, contains the colouring-matter, and consists of cells, like the bricks of a tall chimney. Hair may grow as long as six feet. If cut, it re-grows, as it does if pulled out of the follicle. It projects obliquely from the horse's skin, and has a tiny muscle (erector pili) attached to it, which makes it stand up when the horse is cold.

Black hairs gradually lose their colour. The colouring matter (melanosis) appears to be absorbed into the system. Melanotic tumours often form around the tail of an old white horse. The skin of most horses is black; this protects the dermis from the sun's rays. White-skinned horses are liable to blister.

The "chestnuts" inside the fore-arm above the knee and inside the hind-cannon below the hock, are appendages of the true skin. They are decadent glandular structures.

The ergots at the back of the fetlocks are the remains of the ancestral foot-pads (like the dog's foot-pad).

Similarly, with the outer layer of the skin, the ends of the hairs and the hoof exfoliate as these cells dry up. Grooming helps to keep the hair healthy, but it does not make the hair finer by friction. Perspiration also stimulates exfoliation and secretion of sebum, but does not increase the growth of hair.

The under-surface of the epidermis obtains its nourishment from the lymph in the lymph vessels of the dermis; the outer layers become dryer and dryer as they grow away from the dermis.

Continued pressure or continued friction, if not too severe, causes increased blood-supply to the dermis and of lymph to the epidermis, and a consequent increase in growth of the latter, which accounts for a thickening under the saddle (similar to the palms of our hands). These overgrowths (hypertrophies) are not diseased.

Further, the health of the whole body is affected very beneficially by stimulation of the blood-supply. Grooming encourages this action. Increased blood-supply means increased growth, and improvement in the health and function of an organ. Therefore, grooming, in the form of massage (body brush and wisping), is necessary to improve the health of the animal, and to increase the size and hardness of his muscles.

Grooming is necessary to keep a horse free from chills and other diseases.

Grooming is necessary, under domesticated conditions, to keep the horse's coat clean, for appearance, comfort, and as a prevention against disease.

To recapitulate: grooming cleans the horse and prevents disease, removes the dandruff and perspiration, stimulates the hair and sweat-glands, massages the muscles and increases the flow of blood, thus improving the coat, the muscles and the whole system.

The lazy groom, who is not under the eye of a careful and experienced horsemaster, removes the dirt, but does not groom the horse; he "quarters" but does not "strap." Grooming is never done better than in the racing stable, where often two strappers are put on to a horse together. In commercial stables, excessive grooming would not be feasible on account of the expense of employing extra labour, and the horse keeps fit from the regularity of his work, which in itself does not demand a high state of muscular hardness. Messrs. Tilling, of London, the largest job-masters in the world at one time, used to give their horses a good twenty minutes' grooming a day. But twenty minutes by a good groom is worth more than an hour by a poor one. The secret is rapidity and weight behind the work.

Neglect of grooming when a horse returns from work may result not only in a severe chill, but perhaps in congestion of the lungs, disease of the liver, etc. A horse may break out into a cold sweat through the sweat-glands being stimulated more than the bodily temperature is raised. Friction to the body is the best remedy, or sponging over with a damp sponge and walking the horse about briskly for ten minutes.

Violent exercise causes an increased blood-supply to the muscles and body surface; if the latter is chilled, as often happens when a hunter returns home in a train or motor-truck, the blood at the surface is driven inwards, causing congestion of the lungs, the intestines, or the feet (founder). Plenty of water should be given to stimulate the action of the sweat-glands, and the flow of blood to the surface, combined with exercise and vigorous hand-rubbing over the body.

In countries where the winters are very cold, it is not uncommon for a horse to get frost-bites. When the circulation to affected parts is restored too suddenly, rupture of the small blood-vessels may result, with severe inflammation and pain. The best means of guarding against this, is to rub the affected part with snow until circulation is restored, and never to enter a warm place while the part is frost-bitten.

A horse should not be groomed for several days before he is turned out to pasture, so as to allow the natural grease to furnish protection. The mane, if a hogged one, should be allowed to grow a few days during the summer, to prevent the flies getting on it and "stinging" the crest.

Method of Grooming.—Successful grooming can only be learnt by watching others and by much practice. A good groom should go over a horse thoroughly in one hour. The whole weight of the body should be put on the brush, the arm being used nearly straight. A man cannot groom a horse properly unless he perspires himself. This is why grooms are generally so healthy and never suffer from lung trouble. Grooming develops the chest and keeps the shoulders open. The trend of modern youth to devote the major part of their energies to selfish amusement is directly in opposition to sound horsemanship.

Begin with each brush, or the rubber, on the near- (left) side of the head, work down the neck, shoulder and fore-leg, then the trunk, hind-quarters and hind-leg. Hold the brush in the left hand when working on the near-side, and vice versa. Then do the off-side with the same brush. Then the near-side with the next brush, and so on.

If the horse is very muddy and the weather cold, begin on him as soon as he comes in. Rub him vigorously all over with a wisp of straw. This removes the mud, increases the circulation, dries the coat, and prevents chill. Hand-rubbing is the quickest means of drying a wet horse. If the horse is wet and steaming, a quick sponge over will do no harm; but it must be followed by a brisk rubbing-down as described.

Hand-rubbing at any time is most valuable; the open hand and fingers are used. Twenty minutes of it each day after grooming, or at evening stables, is invaluable.

If a hunter is tired on return from a hard day, provided he is not wet, it is better to rug him up and give him a good hot gruel and hay, and groom him after he has had a half-hour's rest. We assume that the horse has been brought home slowly, and therefore cannot be in a sweat.

His legs should be well wrapped up in wool bandages and his feet examined. If he is much exhausted, give half a pint of whisky or a quart of ale or stout as a drench (the whisky must be diluted with a pint of water). Fresh air and warmth is what he needs.

When the saddle is removed, a wet patch is generally found underneath; this must be energetically hand-rubbed until almost dry, to prevent lumps forming. (*See* page 105.) The back and girth must be carefully examined for lumps or rubs. If the horse has been mounted for some time, the saddle should not be taken off at once; but the girths loosened only.

The ears should be dried by being gently pulled through the hands until warm. This is an important point in attending to a wet horse.

When a horse comes in with his legs wet from the mud outside, no harm will result in letting him stand for a quarter of an hour nibbling at hay after he has been watered. By that time the legs will be dry and the mud can be brushed off. Experience shows that legs treated in this way, even in the Canadian winter, never get scratches. Grooms are much too fond of washing legs down on return from work. Its general practice should not be allowed. Washing legs in the stable is very different from the horse getting his legs wet out-of-doors while in motion, when the circulation in the limbs is at its fullest.

White legs, of course, have to be washed fairly often; but cold water only and castile soap must be used. The legs must be dried thoroughly afterwards with a rubber and then with dry sawdust. Care must be taken not to irritate the backs of the pasterns by too much friction.

It is usual to pick out the feet at the beginning of grooming. This must always be done at early morning stables and after return from work to ascertain that there are no nails, stones or other foreign matter in the cleft, grooves, frog, sole, etc., and that the shoe is on normally and all the nails in correctly. If the foot is washed, cold water and a water-brush should be used, and care taken that the heels are not wetted. Washing of heels is responsible for scratches. The hoofs should always be washed out at early morning stables to remove manure, etc.; on return from work, picking out with the hoof-pick is quite sufficient. The hoof-pick must not be sharp enough to endanger puncturing the foot; use it from heel to toe. Neglect of the foot causes thrush (q.v.).

If the horse is properly dry it is then usual to use the dandy-brush all over. This brush is held and used in a similar manner to a clothes-brush on a heavy overcoat. In brushing the back and hind-quarters, the dandy should be changed to the other hand; when on the left side into the right hand, and facing the horse. A dandy should be large and made of the best French fibre. A new brush must be well soaked in cold water before it is used.

Then the body-brush is used. This brush should have a flat surface and a wooden back, and be made of the best English pig. The curry-comb is used to remove the dandruff and dirt from the brush. The brush should not be scraped too much as it will wear the bristles out. This brush must be used in a circular or to-and-fro motion, so as to get at the roots of the hairs and stimulate the skin, etc.

The body-brush must be used with energy and system. The groom's heart must be behind his work.

Care must be taken in grooming inside the top of the legs not to hurt the horse; some are very sensitive inside the thighs. In this case the hand should be used and not the brush. Be careful not to knock the head or other bony parts with the back of the brush.

The curry-comb should not be used on the horse, except very gently to remove dried cakes of mud that the brush will not move. A rubber curry can be used anywhere, particularly for removing hair. The fingers are the best means of cleaning the hocks.

In grooming and washing the heels, the leg should be on the ground with the horse's weight on it to keep the skin at the back of the pastern tight; grooming a heel with a leg held up or the fetlock flexed, runs the risk of injury to the wrinkled skin at the back. The brush should also be used chiefly in the direction of the hair.

The mane and tail should then be groomed. These need to be brushed out with one end of the body-brush very carefully, lock by lock, at the roots. If brushed as the human head is brushed, or as a dandy is used on the horse's back, it will ruin mane and tail by breaking the hairs. A good tail can be ruined in a few days by one who does not know how to brush it out properly.

No hair should come out on the brush. The brush must never be used for separating the hairs of the tail; this must be done with the fingers, preferably slightly oiled with olive oil. Most grooms break the hairs of the tail by vigorous brushing on the outside, and thus quickly spoil it. A dandy will ruin mane or tail.

The tail is begun at the top, and the roots exposed by raising the hairs in small locks. By traversing across the tail and working down in successive layers the end of the dock is reached. The tail should be well washed out with warm water and castile soap every week or two. Afterwards it should be well rinsed by dipping it right into the bucket and thus avoiding wetting the hind-quarters too much. Laundry soaps must never be used on manes and tails. The soap should be well rubbed into the roots to remove the dandruff. A long white tail can be kept clean at night by being loosely plaited up below the end of the dock. Tight plaiting must never be left done up over night. If this is allowed with manes, there is a great danger of the hairs coming out in bunches.

The mane is brushed out similarly by beginning at the roots, lock by lock, from the poll.

In washing the mane, care must be taken not to get the head and neck too wet.

Tails and manes must never be roughly combed out If a comb is used at all, it should be slightly oiled so that it will not pull the hairs out.

After dressing the mane and tail, the wisp should be used in the same order as the body-brush. It should be applied with much energy on the neck, body and quarters. Care should be taken not to thump the horse over the loins, on account of the kidneys being situated underneath. The wisp should be slightly dampened. If there is a shortage of hay, the wisp can be made of straw, or, as a makeshift, an oat-sack can be used.

The rubber is then used all over the horse. The full weight of the groom must be used behind the wisp and rubber.

After this the mane and tail are lightly smoothed down with the water-brush slightly dampened.

Then the eyes, mouth, nostrils, dock and sheath should be thoroughly and carefully sponged out with cold water. This is most refreshing to the horse in hot weather.

At evening stables a good quarter-of-an-hour's wisping or hand-rubbing will do much good. Hand-rubbing must be done with energy. This originated in the East, and is of greatest value in keeping a horse in condition.

A horse's sheath must be sponged out daily, and the yard drawn out, and the sheath washed out with warm water and castile soap at least once a month. This is much more necessary with a horse that does not pass his penis properly when staling.

The teats and udder of a mare should be sponged daily, and once a week washed with warm water and castile soap. This is very important with a sucking-mare to prevent the foal getting dirt into its mouth.

Small flies are sometimes found inside the ears in summer, which make the ear very tender. The ear should be handled very gently and the inside wiped with a sponge dampened in a creolin solution. The solution should not get into the ear itself.

Care should be taken not to tie a horse up on the pillar-reins so that it can rub its tail against the manger.

Farm horses with rough coats are often curried over with the curry-comb. A rubber curry is best.

A grey horse that gets stained by the bedding is best washed on the stained parts with castile soap and cold water; clean sawdust should then be rubbed over to dry and whiten the part.

Work horses that are exposed to the elements all day and left standing about do not require the amount of grooming necessary for the hunter or the troop horse, or the private carriage horse.

Horses should be given their proper grooming or "strapping" after their daily exercise, and only "quartered" in the early morning. The same results cannot be obtained by grooming a horse before his work as after, when the functional activities of the whole body are increased.

A good groom will soon cover up the ribs and hips of a thin horse. A bad groom irritates his horse, tires himself and achieves little.

A horse in real condition cannot be soaked in rain, because there is nothing to hold it.

If short-handed, it is more important to groom a horse thoroughly every other day, than to half do it every day. During the 1914 war, at the remount depots, it was found that a thorough grooming every third day prevented mange, which disease was very common on the farms in Flanders.

When a horse is losing his coat in the spring or autumn, the removal of the old hair is hastened by hand-rubbing with dampened fingers; the rubber curry or india-rubber can be used.

In winter, because he is doing less work, a horse is often neglected in his grooming. He needs it just as much; in fact, he needs more care then, with the cold and wet, frost and snow, especially with regard to his legs and feet. He requires extra grooming to make up for the lesser perspiring.

In grooming, a horse must never be ill-treated; he must be used gently at all times, otherwise he will get to dislike being groomed and give very much more trouble to the groom. He should associate grooming with nice things. (*See* page 38.) He should never be fed oats while being groomed, but can be given hay.

To Test for Good Grooming.—Horses should be periodically examined to see if they are properly groomed. These inspections should take place when least expected. With a thoroughly conscientious groom there is little need for worry; but the best of men will tend to get slack or careless unless they know that their master is interested in the horses and knows when they are well cared for, and periodically examines them.

The coat should be examined with the fingers for dandruff and grease. The roots of the hair of the mane and tail, the chest under the girth, the hocks, between the fore- and hind-legs, the belly, the heels, the grooves in the feet, the dock and the sheath should all be carefully examined. Where the saddle, harness and bridle rest, examination should be made for sweat marks. The forehead and round the ears should be gone over, and the eyes, ears and nostrils examined closely to see that they are clean.

Grooms.—The good groom must be fond of horses; a man who is not genuinely so, will never take the extra trouble that is so necessary with regard to horses. He must be willing to give up some of his own time and must never neglect his horses because he is in a hurry. He should never have to be told a thing twice. It is important to inculcate the feeling of proprietorship. He must be observant, clean and tidy, cool-tempered and energetic. He must be absolutely honest to his master, to his horse and to himself. As Shakespeare tells us: "To thine own self be true; and it must follow, as the night the day, thou canst not then be false to any man." There are no better grooms than the Scots and the English, and a good Irishman. There seems to be something bred in the Old Country grooms that gives them a genuine love for horses and for working around horses, that is found in no other nation. A groom must not be a grumbler, or a drunkard.

A groom must report at once any sores, lumps, treads, cuts, picked-up nails, loose or sprung shoes, loose nails, catarrh of nostrils, soreness in eyes, scratches, rope-galls, lice, ringworm, mange, or other skin trouble, girth or saddle injuries, bit injuries, sore tongue or roof of mouth, off-feed or water, irregularity in droppings or urine, itchiness, restlessness, or any irregularity in the coat; any sign of thrush in the foot, and any soreness, stiffness or lameness, running of the eyes, or indeed anything abnormal in the appearance of the horse.

The Coat.—We learn from physics that a shiny, white surface reflects heat best, and radiates and absorbs heat least; a dull black surface reflects least, and absorbs and radiates best. Therefore, in the summer, a well-groomed white horse feels the heat least, whilst a dull black, feels it most. In the winter the white radiates its body heat least, whilst the black radiates his most quickly. But Nature partially counteracts the defects in the black by providing extra dark pigment which prevents the sun's rays passing through so well. In very hot sun the coat of a dull black horse is very hot to the feel. The coat, by absorbing a considerable amount of sweat, prevents too rapid evaporation and chill. The rate of growth and the length of the coat depend on the temperature of the stable, the clothing, and on exposure to heat or cold outside. Although grooming will stimulate the hair follicles, it does not cause the hair to grow longer but it makes it more healthy. In the winter in the North-West, horses turned out and fed hay in the open would grow coats two or three inches long.

Horses should be protected as much as possible from the direct rays of the sun. The sensitiveness of the horse's face compels him to stand with his back to a strong wind, with tail tucked in. This causes the hairs of the coat to blow up, and he thus loses a great deal of the protection from it. It is clear that in the early days the horse lived in parts where he could obtain protection. It is therefore essential that a horse, when turned out, be provided with some form of wind-shelter. During cold weather, some of the dandruff and grease should be left in the coat to provide extra warmth.

Care of the Legs.—The horse's legs require careful attention. With irregular or insufficient exercise they are very liable to become filled. This puffiness is due to the lymphatics and small blood-vessels becoming engorged. This stagnation in the ends of the limbs is due to want of exercise, over-heating food (such as peas and beans), bad circulation, strain or sprain. Idleness after severe work will often produce swelling. A horse should have a good two hours' walking the day after a hunt. This filling can be reduced by massage and cotton-wadding pressure bandages. A horse that suffers from chronic filled legs should be bandaged for two hours after exercise, and the legs should be well massaged on removal of the bandages. (*See* page 178.)

The massaging should be done by vigorous friction of the fingers up the legs against the lay of the coat. This must be done for fifteen minutes to be of any real benefit. Cotton-wadding is then wound round, and over this a wool or thick cotton bandage is wound tightly enough to cause pressure on the leg. Hind-legs are more liable to fill, as they are farther from the heart. Filling denotes a weakness, therefore such legs are more prone to injury; the circulation is abnormal, and this affects the tone of all the tissues.

The present fashion of encouraging long feather or fine hair on the lower part of the legs of Shires and Clydesdales, particularly the former, is not sound. It predisposes to disease, and appears to be in direct opposition to sound modern horsemanship. The excuse with some for depriving a farm horse of its tail, that it saves labour in cleaning, seems utterly foolish, when everything is being done to develop four legs covered in long, fine, white hairs, which require very much labour to keep clean.

Tools.—A good, **French-fibre**, large dandy-brush, and a hard, flat, English-bristle body-brush, are the first essentials if a horse is to be kept well groomed in moderate time. A curry-comb of the comb-teeth type is also a necessity. The body-brush and comb should have a broad web strap on the back, through which the hand is passed. Other requirements are a hoof-pick, which must not be sharp; the type that closes up, and can be put in the pocket is the best. A water-brush, a good sponge (which must not be the same as used for soaping saddlery) and a stable-rubber (two or three of the latter are necessary to allow for regular washing); a scraper for removing rain or sweat on rare occasions; trimming scissors, mane-comb, rubber curry and wisp. Tail shears are useful for squaring the end of the tail, when done.

The foregoing are the necessary tools for grooming. The wisp can be made in the stable and replaced periodically. It is formed by twisting up a rope of straw or hay by means of a rake; the rope should be six to eight feet in length. This is folded into two double rows side by side, the length of each row being about 10 to 12 inches; the rest is interwoven backwards and forwards round these rows, forming a hard mat about 12 by 5 inches, and 1 inch thick. It must be made quite tight. It is dampened to make it bind together better.

Clothing.—A horse at work, or at pasture, does not require clothing, because sufficient heat is produced by the exercise, and if the weather is severe, Nature provides a thicker coat and extra fat to keep the body warm. A horse should not be worked with a blanket on, especially under the harness, except in cases where he is standing around exposed to the cold and only moving occasionally at a slow pace, or in very wet weather when waterproof sheets may be used over the back. But in mild climates when the work is at the trot, the horse is better exposed to the rain, as under these conditions a waterproof is not healthy. A horse could not do hard work on a wet day in England with a waterproof sheet on. Rubber sheets allow for no ventilation and cause condensation inside; this condensation may cause a chill if the horse is left standing about too long. If the sheet is lined with wool care must be taken to dry it inside after use.

When a horse comes into the stable he requires clothing, because the temperature of the stable should never be over 60° F., except in summer. Grooming removes a lot of the grease and natural warmth, and this, added to the fact that the horse is standing still, makes clothing a necessity. Even in summer, a light blanket or rug is often advisable at night.

We know that a dark rough rug is warmer than a light smooth one. (*See* page 173.) The heat-conductive properties of the rug play an important part also. Iron conducts heat 500 times as rapidly as wood, and wood more rapidly than flannel or felt. The material must also possess sweat-absorbing properties. Wool and flannel fulfil these conditions best.

Clothing also produces warmth by enclosing air inside it; a rough wool rug does this. Such a rug also allows for good ventilation.

Where wind comes into consideration we have, of course, another factor to contend with.

A rug, strictly speaking, is a blanket, breast-cloth and roller combined. A full suit of clothing consists of quarter-sheet, breast-cloth, hood, roller, roller-cloth and fillet strings (which hang around the thighs). The suit may be made of wool, jute, or linen. The last is used in summer. The whole suit is most useful for travelling by train or motor; but its general use in stables is not advocated. The hood is useful to sweat a horse's throat when it has a cold. It is attached under the neck and jowl with tapes; the eye-holes and ear-pockets must be sufficiently roomy.

Woollen clothing must be kept scrupulously clean and never be put on a strange horse, for fear of skin disease. In such a case it is a good plan to put a cotton sheet on, and then the warm suit on top. Cotton clothing is easily disinfected or washed.

In washing woollens care must be taken not to allow them to soak in hot water and not to soak at all for any length of time. Lukewarm water should be used, with laundry soap or Lux; the rinsing-water must be of the same temperature, to prevent shrinking.

It is usual to keep good rugs or blankets for the daytime, and

EIGHTEEN YEARS' SERVICE

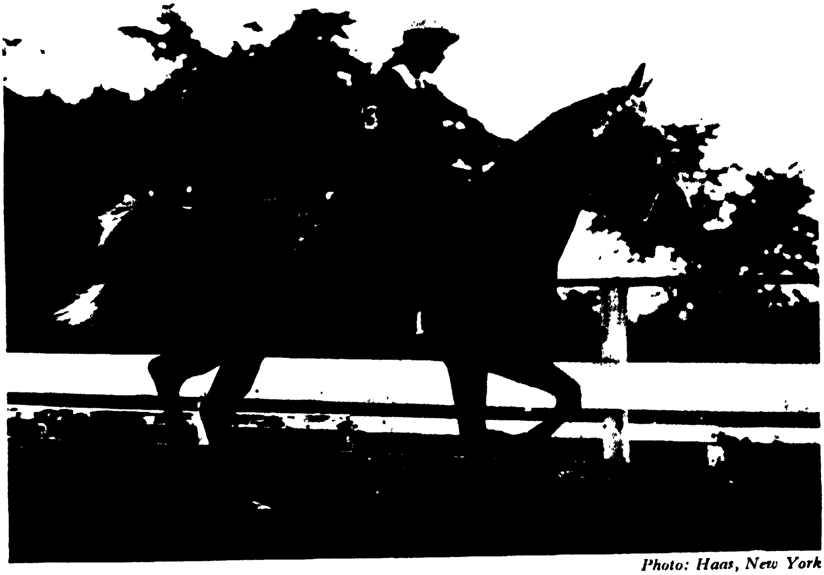


Photo: Haas, New York

SADDLE-PONY : FLINTSTEEL

INTERIOR OF STABLES: STALLS

INTERIOR OF STABLES: LOOSE-BOXES

to use old or cheaper ones at night, and on Sundays when the horse is left bedded down. When the rug is not in use it should be aired. It must always be aired for a while after being taken off.

Thigh straps, or fillet strings, are necessary if there is a chance of the rug blowing up off the quarters. The former also prevent the rug slipping round. Separate rollers, which must be well padded on each side of the spine, are often necessary to keep the rug on properly at night. They must not be buckled up too tightly.

The heavy service rug is made of flannel, covered with duck, which will turn quite a lot of rain. It has its own two-buckle roller attached, and one buckle at the breast. Some of these have thigh straps.

Waterproof clothing of any kind must be absolutely forbidden inside the stable. The practice of sweating a horse by this means is both cruel and dangerous.

Light cotton clothing is useful to keep a horse clean. Unclipped horses require only light clothing. None must ever be too heavily clothed; it weakens the power of resistance to colds. Grooms are too fond of using too much clothing to save grooming, it makes the coat look sleek; but such a coat does not keep its gloss long on exposure. Good grooming is the only way to get a permanent gloss. Loin-cloths in harness are useful, especially on clipped horses; they prevent chill on the loins. They should be made of blue broadcloth.

The amount of clothing required to take the place of the hair when a horse is clipped is approximately equal to a thick woollen blanket.

When travelling, a tail-guard is generally advisable to prevent the dock being rubbed. It consists of a leather cover that buckles or laces around the tail and is kept in place by attachment to the crupper, or to the rug.

An ordinary three-inch flannel bandage can be used. Great care must be exercised in putting it on to prevent the horse swishing it off ; several locks of the hair must be slipped under the turns to prevent it slipping down, otherwise the bandage will not stay on. It must never be put on tightly or serious damage to the tail may result.

The tail may be protected by plaiting right down the back. (*See* page 193.) (For rubbed tails, *see* page 202.)

Bandages.—The chief use of bandages is to apply pressure to a given part, generally the leg. They may be used to prevent

Sound legs that are bandaged during exercise are benefited chiefly by the support rendered to the tendons, etc.; unsound legs, by causing increased blood-pressure and consequent repair of the damage and resistance to further harm. Bandages must therefore be very soft inside, and strong outside. This condition is secured by using cotton batten or wadding inside, and wool, flannel or cotton outside. Flannel is the best. The outside bandage should be quite tight; it cannot arrest the circulation. Ordinary bandages, unpadded inside, can do much harm if put on tightly.

To apply a pressure bandage, take a strip of cotton batten, 10 inches wide and about 18 inches long, and wind it round the leg below the knee or hock, so as to reach half-way down the fetlock. A good plan is then to put on a cotton bandage to keep the batten in place; one 3 inches wide and 2 yards in length is sufficient. Then a flannel bandage should be wound tightly over the whole. The under cotton bandage is not essential. The flannel bandage should be 9 feet long by 3 inches wide, or 6 feet by 4 inches. The Sandown fleecy wool bandage is recommended. Cotton bandages are used chiefly for surgical purposes.

Bandages should not, as a rule, be left on at night; if, however, they have to be, they must not interfere with the flexion of the knee, hock or fetlock. Their best use is for two or three hours after exercise. If they are kept on for too long at a time they weaken the legs. Below the knee or hock they support the two back tendons and prevent filling of the lymph vessels.

In putting on a bandage it should first of all be rolled up with the tapes inside, and the inner side of the bandage inside. Commence at the top of the part, say the fore-cannon, and leaving six inches at the end free above the top of cannon, roll outwards and backwards and downwards round the leg until reaching the fetlock, then wind up, and when the knee is reached, turn down the free end that had been left; then roll once round outside this, which will hold the bandage and the tape quite secure. The tape should be two feet long and sewn at its middle to the end of the bandage. The knot must be on the outside of the leg and not on the front or back.

Strong safety-pins may be used in the place of tapes; but they are not advisable for hunting. Safety-pins must be put in horizontally (never vertically), and on the outside of the leg.

Rolling.—Horses love rolling in a sand-bath or on soft ground. It is most beneficial to their health and their coat. It is a great stimulant to the liver, intestines and the horse's spirits. Clean sand makes the best bath, though peat moss or tan bark will serve. The latter, however, is dirty and necessitates much care of the feet. Idle horses should be turned loose for half an hour at least every day to allow them to roll.

A sand-bath should be 20 feet square, and the sand at least 6 inches deep. After rolling, great care must be taken to brush out all the sand, etc., before putting on a saddle, harness, or the rug. If the sand is left in, it will soon cause a sore back.

Sand or sawdust rubbed lightly over a wet back will dry it, and remove much of the grease.

Bedding.—Bedding is necessary to allow the horse to lie down without injuring his knees, hocks or elbows; to prevent chills, from lying on a damp or cold floor; to keep the horse warm; to encourage him to lie down as much as possible; to absorb the urine, etc., and for appearance. Horses that are left standing on hard stable floors most of their time, should have the bedding down for a good part of the day to save their feet. Hard floors are severe on horses' feet.

Bedding may be of straw, old hay, peat moss, sawdust, shavings, sand, leaves, rushes, ferns, or even fine branches: but leaves, ferns, and branches are not healthy, and should only be used as a temporary measure. Tan bark should never be used, as it rots the frog and causes thrush. Leaves of yew, beech, or box should never be used; they are poisonous.

Peat moss will absorb six times its own weight of water; straw, between two and three times. Barley straw is most absorbent, oat next, and wheat next.

Bedding must absorb the fluid and gases, be free from odour, soft, a bad heat-conductor, cheap, easily procurable, free from properties that damage the feet, and unpalatable to the horse.

Anything, such as peat moss, that will clog in the feet is not very suitable. Tan bark, containing tannic acid, acts on the soft horn of the frog; a horse on returning from the riding school must have the cleft and grooves of the frog thoroughly freed of tan bark. When these materials become soaked with urine the action on the feet is increased.

Straw is, without doubt, the finest material for bedding, and wheat-straw the best of all, as it lasts longer, is stiffer and less liable to be eaten. Oat straw is more likely to be eaten and becomes soiled more easily and matted into lumps. Barley straw may cause skin irritation.

The long straw from the English threshing machines is the best. The modern American separator breaks up the straw too short.

The army horse is allowed only 8 lb. of straw a day, or 56 lb. per week; this is not sufficient.

The bedding must be taken outside at early morning stables, and aired in the open, in wire cages or on racks. It should be turned over during the day. Never, on any account, must it be left in the stalls under the mangers; the gases will ruin the horse's eyes and lungs. Thorough airing will effect much economy and keep the horse much cleaner. Litter shelters should be provided for wet weather.

Bedding should never be wasted. New material should not be put on top of wet, soiled bedding. If horses are left bedded down on Sundays, extra ventilation will usually be required.

The manure and wet portions of the bedding must be removed periodically and thrown on the manure heap, which must not be placed so that the fumes from it can get into the stable. It should be cleared away daily during the fly season.

The droppings should be taken out of the stable, and not left in a basket or barrow inside.

A heavy draught horse excretes over 50 lb. of dung per diem, this being approximately double the weight of the food eaten. When a horse has been tied up to the pillar-reins in the stalls, great care must be taken that no droppings are afterwards left in the manger.

Peat moss, if used, must contain mostly fibre and cork-like lumps, and very little earthy material. It absorbs gases and liquids very readily, and requires to be renewed more frequently than it would appear, because it becomes a saturated mass of harmful chemicals which rots the frog of the foot. Its use in the British Army was stopped some years ago when it was found that, unless the greatest precautions were taken, it caused thrush. The fact that it is fireproof is its chief advantage.

It is very useful on board ship or the train, as it will not blow about and stays in place well. It is, too, easily stowed away. The wet portions must be continually removed and the horse's feet carefully picked out and washed daily.

Sawdust, wood shavings and sand are fairly useful when procured cheaply in a clean state, but they are not suitable for private stables or for horses with a fine coat. The shavings should contain no pieces of wood. Sawdust makes a comfortable bedding and is clean; it must be used thickly enough to allow comfort to the horse in lying down. It has, however, a tendency to heat the feet, and must, therefore, not be left down all day. The feet should be watched and wet sawdust put out to air. Sawdust is valuable in stables that are not drained. It can be used under the straw.

The bedding should be placed well forward because horses generally kick it back; but if the horse eats his bedding, it must be laid a little back from the manger, and the horse not given too much rope. If the horse paws it back, lay it thinly in the centre and thicker on the sides. Unless the horse is lying down, the bedding should be attended to last thing at night.

Stable Economy.—Great care should be taken to make the bed as evenly as possible, and free from lumps. When baled straw is used, the lumps must be broken up with the hands; it cannot be done properly with the fork. Carefulness must be exercised when entering the stall with a pitch-fork of straw. It is far safer to use the hands and arms, and thus eliminate any risk of pricking the horse's legs accidentally with a prong of the fork. When entering with the fork to tidy the bedding, etc., always let the horse know you are there; if he is suddenly startled, he may very easily run a leg on to the fork. If a prick with the fork should occur at any time, the wound must be treated antiseptically. (*See* page 260.) If a horse does not move over in the stall quickly when told to get over, do not become harsh and use rough measures. It will do no good. Patience is always essential. Hitting a horse in the stall with a broom-handle is a contemptible method of treatment. Sensible and humane methods will soon teach him to be obedient to any of our wishes. A horse that has been harshly treated in the stall shows it at once, and he may soon become ugly in his behaviour, and acquire a reputation for bad temper which is not justified. It is, of course, the groom's mismanagement which is to blame, and a man of this kind is quite unfit to attend to any horse. Kindness saves no end of trouble in the long run; and, moreover, it is economical.

Shouting or other noises should not be allowed in the stable. The horses should be disturbed as little as possible.

The whole stable must be kept scrupulously clean. It should be constructed of sanitary material (Chapter VIII); the walls can then easily be washed down every few weeks. The floors and stalls should be washed down once a week with a 1-per-cent. solution of creolin or suitable coal-tar disinfectant. Wooden walls and mangers should be lime-washed over the parts near the horse once a week; and the whole stable twice a year. Whitewashing or disinfecting of mangers is most important in livery and sale stables. Metal mangers should be scrubbed out with hot water and soap once a week. After infection they must be treated with 1 to 500 solution of mercury perchloride or steamed. Mercury perchloride is poisonous; the vessel must be well rinsed after. It has a deleterious effect on plated articles. Disinfectants with a strong odour must not be used. Water-buckets must be left clean and washed out occasionally, as with mangers.

Sanitary distempers should be brushed clean every few weeks, and repainted at least every six months. Oil-paint can be scrubbed with soap and water. Glazed bricks and tiles should be well cemented in between, and can be scrubbed with a hard brush with soap and hot water.

Windows should be cleaned inside and out once a week. It is usual to brush down cobwebs to prevent the increase of spiders; but in the fly season, cobwebs are better left up as they collect a number of flies.

Wooden floors should be kept as dry as possible. Sprinkling sawdust over them will help to this end. They must be scrubbed once a week.

All drains must be flushed down daily. The traps should be opened and cleaned and some disinfectant put down once a week. If the drain smells, or is in any way out of order, it must be attended to without delay. Neither horses nor men can keep healthy if the drains are not right.

Smoking, carrying naked lights, and the use of matches in the stable must be strictly prohibited. If lamps are used, they must be placed or hung so that they cannot be knocked over. Oil lamps should never be used over straw or hay. Smoking must not be allowed in a forage shed, nor near a haystack when there is a wind blowing.

In tying up the horse in the stall the length of rope should allow his nose to reach the ground comfortably under and around the manger, but while his head is in this position the loop of the head-rope must not touch the ground or be within four inches of it; there will then be no danger of his fore-foot getting over the rope and causing him to be cast. If a horse is properly tied up there is no reason why he should ever get cast in the stall. The safest plan is to have a log on the end of the rope that passes through a ring in the manger. This log must be heavy enough to keep the rope up, but not too heavy. (*See* Halters, Chapter V.) If a rope is used temporarily to tie up a horse great care must be taken that a slip-knot is not used around his neck.

Another method of tying up a horse that gets his legs over the rope is to use two ropes, one from each end of the manger; but this method should be very rarely necessary.

I find it a very valuable plan to teach a horse to free himself when he gets a leg over the halter rope. The principle is to put a leg over and lift it quietly back, and to repeat this until the horse will lift his leg back himself when you put it over. This does not take long with most horses.

For horses that are liable to eat or chew the rope a rawhide strap should be used; or the rope soaked in a solution of creolin from time to time. A solution of aloes answers the same purpose very well. Some horses are apt to knock their knees on the halter log; this can be remedied by passing the rope through a ring or slot fixed at the back of the manger platform, so allowing the log to hang near to the wall under the manger. (*See* page 215.) Chains and iron logs are very noisy and disturb horses. Any noise that interferes with their rest must be avoided.

Owners should pay surprise visits to their stables to see that the horses are given sufficient length of rope at night to allow them to lie down in comfort. I have discovered instances where unprincipled stablemen have tied horses up short to save them work in grooming.

Stopping the Feet.—Over-washing will tend to make the feet too soft. Working on wet roads has not quite the same result, because while in action the increased circulation counteracts the ill-effects. Feet may become too brittle, and require stopping. Once a week should be sufficient. The best plan is to fill the under-part of the foot with puddled clay or hoof-tone, or even bran-mash, the night before the horse's day of rest and not to pick the feet out next day. Well puddled clay should stay in. The feet must be thoroughly cleaned out before stopping.

To prevent feet becoming balled with snow they should be brushed over inside with oil or grease before the horse goes out.

Should they become balled with ice, they are best cleared of this by having the shoe tapped gently with a hammer on the ground surface.

(For Foot Dressing, *see* Chapter IX.)

Examining Shoes.—Too much care cannot be taken in examining the shoes when a horse returns to the stable. Tapping with a small hammer very lightly is the best test for looseness. All nails and clenches must be correct. The shoe must rest evenly on the foot all round.

Brushing-Boots, etc.—Various boots can be purchased reasonably on the market. A Yorkshire boot is excellent to prevent fetlock-brushing. Take a piece of thick flannel, 8 inches wide, and long enough to go twice around the horse's fetlock. Put this on so that the middle will be level with the top of the fetlock. Tie in place with tape. Turn down the top half over the tape, and lower half, and the boot is complete. A piece of motor tyre tube does well, and is easily cleaned. It must be large enough not to be too tight.

Speedy-cut boots for the cannon and lower part of knee, and over-reaching-rubbers for the heels, can be purchased at any good saddlers.

Knee-Caps.—Knee-caps are advantageously used on horses at exercise on stony places or hard roads. They should be buckled on two inches above their correct position, the top strap being fastened fairly tightly. The cap is then slipped down into place, and this strap will be of the correct tightness. The lower strap must be quite loose.

Leading into Stable.—When leading a horse through a door, care must be exercised that he does not knock his hips, catch his saddle or harness, or in any way get a fright that will afterwards cause him to rush through the door. This objectionable habit is caused by ill-usage. In passing through a narrow door the groom should turn about and take a rein in each hand, close to the bit, and lead the horse through carefully.

Some horses will not lead if the groom stares them in the face; others require a fair length of rein.

In leading with the halter-rope or the reins over the horse's head, the end should be held in the left hand, and with the right hand the horse should be steadied fairly close to the head-collar or bit. In turning the horse at the walk or trot, turn him inside yourself, and never swing him on a circle around yourself; he may get away from you.

Clipping.—This subject requires to be studied from the horse's point of view and not from one of "show." In nature, the horse has a long coat. But he does not exert himself at hard labour while in this coat, any more than a gymnast would work on a trapeze in a coon coat. It is therefore most unreasonable, cruel and very uneconomical to expect a horse to do hard work in his winter coat, unless the climate is very cold. In climates such as that of England, it is necessary to clip nearly all horses that do even moderate work at a pace faster than a walk; while many require to be clipped two or three times during the winter.

We clip off the horse's "permanent" coat and provide him with a warm blanket when at rest. Farm horses that can do their work without getting excessively hot are better unclipped; the same applies to all heavy draught horses. But when a horse while working gets into an excessive sweat, it shows that his coat is too heavy and needs clipping. If he is made to work day after day in a sweat-soaked coat, his health will be affected; he will become exhausted and weakened, and soon unable to do normal work. Evaporation cannot take place properly, and the bodily temperature is not regulated as it should be. The lungs and the whole system suffer.

An unclipped horse that continually gets hot will never carry flesh. A thin horse that is clipped invariably gains in flesh. Nature soon readjusts matters and produces more fat under the skin, though help must be given to provide the extra fat for a few days after clipping by feeding additional grain and linseed. The horse must be kept warm by clothing and food, and not by a hot, stuffy stable.

A horse, then, must be clipped for humane and economical reasons if his coat is too heavy for him to work in comfort. Unclipped horses that come in even with damp coats are not comfortable for some hours, whilst a clipped horse will be dry and can rest comfortably when warmly rugged up.

If the horse is clipped it is our duty to see that he is properly provided with clothing, to make up for the loss of hair whenever he is not actively working.

Clipping is only cruel when clipped horses are kept standing about in cold climates. Such was not uncommon in the past with private carriage horses. In Canada one often sees a clipped harness-horse, when left standing, covered with fur robes.

Care must be taken that the blanket left on a clipped horse in harness is buckled, or pinned, round the breast, and prevented from blowing up off the quarters and loins.

Commercial delivery horses which do much standing about are better unclipped, unless they have exceptionally long coats. It is generally sufficient to clip such on the lower half of the body only—"trace-high," as it is known. Sometimes the legs are kept unclipped as well. Clipping trace-high will prevent most horses from excessive sweating; and leaves a good cover over the back. This method is particularly suitable for delivery horses that have to stand about considerably. Leaving the legs unclipped affords warmth during chilly weather and in cold stables. Farm horses that perspire freely are better clipped trace-high, and with the legs left unclipped. A horse that suffers from mud fever on the belly, should be clipped trace-high. (Plate facing p. 129.)

The extent to which a horse should be clipped depends on the coat, the amount he perspires, his work, and the climate. Common sense must guide one. It is economically sound to see that the horse does not perspire too much, and that he does not get cold. These facts must be considered.

The time at which a horse is clipped also requires due consideration. In cold countries this should be done not later than the end of November, preferably by the middle of that month. He will then get sufficient coat after clipping to provide fair protection during the winter.

In very mild climates the horse is first clipped in October and again before Christmas, and perhaps again at the end of January. I cannot see the reason for clipping at the end of the winter when the coat begins to shed, except to save the lazy groom some work. A well-groomed coat will not require clipping so much as one that is rough and uncared-for.

In war time it is very unwise and possibly very cruel to clip horses all over; trace-high (and not the legs) should be quite sufficient. Mules should only be clipped for veterinary reasons. On active service where there is exposure to risk of mange it is only necessary to clip the neck, the chest between the legs, the belly, and a three-inch ring around the root of the tail. A mule's tail should not be clipped.

Hunters often have their legs left unclipped from a few inches above the knee, and hock down, or higher up. This is advisable in some muddy countries; it also protects the legs from thorns.

Thin-skinned hunters may have a patch the shape of the saddle numnah left unclipped on the back.

Clipping consists in shortening the hair by means of hand- or power-clippers. Electric clipping machines save much labour. The clipper must be presented against the lay of the coat and no ridges should be left on the coat. The horse must be taken quietly, and should he be nervous at first, on no account must he be fought. Horses that object to being clipped have been abused previously. A quiet horsemaster will have no trouble in clipping a horse, and after the first experience, provided that nothing unpleasant happens to him, the horse will not object to the operation.

A horse must not be clipped or trimmed over the bedding or forage. All hair must be swept up at once and burnt, or otherwise disposed of. If it is left about and horses eat it, serious results may follow from a hair-ball forming in the stomach.

While clipping a horse he must be kept warm; when his legs, head or belly are being done, his body can be rugged.

The coat should be singed after clipping. This seals up the ends of the clipped hairs and improves the look of the coat generally. A few days after clipping is the best time to singe; by then certain long cat-hairs will have formed, and these require to be singed off. It is necessary that singeing should be done by an experienced man. A gas lamp is the safest form to use. Kerosene lamps will do, but care must be used in working them over wooden floors. Singeing should never be carried out over bedding. Petrol must never be used in singeing-lamps, but methylated spirit may be used if care is exercised.

Trimming.—The long hairs inside the ears must never be clipped. The hair is there for a very definite purpose. The practice of removing it is entirely wrong. The scissors should be used only to take off the hairs that protrude outside the ear when it is held closed, clipping from the top of the ear to the base. Clipping inside the ear allows cold, wet and dust to get into the inner ear.

On no account must eyelashes or muzzle-hairs (the feelers) be clipped. They are there as protectors and feelers.

The back of the fetlocks of unclipped horses should be trimmed short with the scissors, not with the clippers. Horses that suffer from scratches in the winter are sometimes better if their fetlocks are left untrimmed; I have known of others that are better when they have their fetlocks clipped. As a general rule, trimming with scissors, not too close, is the safest procedure.

Trimming a horse greatly improves his appearance. Horses need to be trimmed every two or three weeks, and sometimes every week.

The Forelock.—It is common in some countries to clip off the forelock only of the mane. This probably originated where the useless overhead check-rein was used. (*See* page 132.)

The forelock was given to the horse as a protection for his eyes against flies and other insects. It also adds to the beauty of a horse's head. Even when manes are hogged, it is the custom in countries where flies are bad to leave the forelock on.

The practice of leaving on some Shire horses a thick mass of forelock that covers the eyes and impairs the sight, appears to be merely a senseless fashion. It must be most aggravating to the horse.

The forelock should reach nearly to the eyes and should be thinned out (*see* Mane, below), so as not to be too heavy. If it reaches below the eyes it may irritate the horse. The function of the forelock, as I have said, is to protect the upper part of the head and the eyes from flies, etc., as the facial portion of the Panniculus Carnosus (*see* page 194) does not extend up to the parts intended to be protected by the forelock and mane. The forelock should never be clipped at the end, nor should some of the hairs be cut out. Where the sun is very strong, a thicker and longer forelock will protect the eyes.

It is usual when the mane is hogged to clip off the forelock too. In this case precaution must be taken to see that the horse is not tormented with flies.

If the horse has no forelock, eye-fringes can be worn on the bridle. Where the sun is very strong the fringe can hang below the eyes; there must, however, be no knots that could strike them. Eye-fringes are made of leather or string. They must be soft, and may be attached to a separate brow-band, or tied on to the ordinary brow-band.

The Mane.—The mane is a valuable weapon of defence against flies, because the fly-muscle (*see* page 194) does not extend to the top of the neck. The horse has merely to shake his head and flap the mane from side to side to rid himself of the offending insect. At the end of the fly season, when flies get sticky, they are difficult to throw off by merely shaking the neck.

The mane should be kept thin; it is then cooler and easier to keep neat. Four to six inches in length is usual.

It used to be the custom to have the mane on a harness-horse lay on the off-side of the neck, and on a saddle-horse on the near-side. Now it is general to have that of the latter on the off-side too.

After the rug is put on or straightened, care should be taken to smooth the mane out properly under it. It is a good plan to dampen the mane slightly when brushing it down on the outside to make it lay neatly.

Manes need to be neatly pulled once a month. It is not an easy matter to do this properly so as not to irritate the horse. Many stable hands are much too rough and pull out bunches of hair, thus hurting the horse and causing him to dislike having the mane attended to. There is no excuse for this. It takes several days to dress a mane that has been neglected for some months. A little only should be done each day. The mane should never be cut with scissors; if it is, the hairs will stick up when they regrow.

In pulling the mane, a mane-comb is used on a small lock of the hair; it is held in one hand and the end of the lock (the longest hairs) is held in the other hand; these hairs are then combed free of the rest of the lock by an upward motion of the comb; the few long hairs are then quickly pulled out. The mane is worked at in this manner along its entire length. If it is not then short enough or thin enough, we start again, and so on.

The mane must never be pulled from the outside, but always from the ends of the longest hairs. The ends of the hairs should be approximately level.

Plaiting Manes.—Manes that are untidy will be much improved by being plaited and left up for a day. Considerable practice is necessary to plait a saddle-horse's mane, or braid that of a draught horse properly. Harness-horses' manes are plaited and cascades are then put into the plaits.

A little demonstration from one who is apt at plaiting is the best way to learn the art.

After brushing the mane well, and pulling it, should it be required, the water-brush should dampen it slightly. The groom should stand on a box or chair so as to be at least level with the crest. The number of plaits vary from seven to a dozen, and in harness-ponies sometimes more. After deciding the width of mane for each plait, the comb is used to divide off this amount. This portion is then divided with the fingers into three locks of about the same quantity of hair. These are plaited fairly tightly together by turning the outer locks under. When an inch or two from the end a piece of thick knitting-wool of any colour is plaited at its centre, into the last few turns. The two ends of the wool are knotted round the locks at the end of the plaiting to secure the plait. The plait is doubled under at its middle and the wool poked through the mane at the crest and pulled, so as to bring the end of the plait against the crest. The wool is then tied round the locks of the mane near the roots, which secures the plait in position. (Plates facing pp. 17, 32, 129.) The wool is best threaded through by means of a packing-needle.

The forelock is plaited into one plait, and generally doubled under, as on the mane.

Manes should not be left up for more than forty-eight hours or the hairs may come out in places. They should never be plaited too tightly.

Heavy horses have their manes braided into various coloured wool, and wool cascades tied into the crest. (Plate facing p. 145.) Light harness-horses have wool cascades tied into the crest after the mane has been plaited.

A cascade is made by winding the wool a dozen times round two or three fingers; the little coil of wool is then pulled off, and very fine, soft iron wire (as used in making artificial flowers) is twisted round the middle of the coil when flattened. The loop at each end is then cut off, thus making a little bundle of wool-lengths bound round the centre. This bundle is then doubled up and twisted into the wire, so as to produce a miniature rosette with 24 ends of wool representing the petals. The free end of the wire is threaded into the mane and twisted round the root of the plait, which keeps the cascade sticking up on top of the neck.

Hogging Manes.—Hogging a mane, that is, clipping it off with the clippers, cannot be denounced as cruel, unless a horse with a closely-hogged mane is turned out to pasture in a country that is fly-ridden. No permanent injury or mutilation is caused, as the mane will grow again.

In hogging, the clippers must be used on both sides of the crest, so as to leave a ridge at the median line. To appear neat, the mane needs to be retrimmed once a week. A hog-maned horse is a great nuisance in countries where flies are very bad.

A mane helps an elderly person considerably in mounting, and as a matter of fact the majority of horses are greatly improved by having a well-kept mane. It is also valuable in preventing sunstroke over the poll.

When a horse is well looked after there seems to be no real objection to hogging the mane, as it will grow again quickly if it is required, or should the horse be sold.

Re-growing Manes.—It takes from six to nine months for a mane to grow long enough to be plaited and weighted. Or it can be kept down and made to be on one side or the other by damping it every morning and putting a hood on. A specially-made cotton hood is better; it should fit the neck properly and be tied with tapes on the under-side of the neck.

Tails.—A good tail greatly improves the look of any horse. Although there are certain breeds that are still commonly deprived of this ornamental and useful appendage, everyone agrees that a well-kept tail greatly enhances a horse's appearance. (*See* Plates facing pp. 16, 32, 240, 272, etc.)

If trimmed, tails should be shortened at the end of the fly season. This can be done either by banging the hairs square or by shortening the hairs with a knife or comb, leaving the end of the tail swish-tail. A banged tail suits some horses, and in the army assists in securing uniformity and neatness.

A tail is best banged with tail-shears. The length depends on circumstances. In the summer the tail should be left to the hocks at least, so that when in motion the end will be a few inches above the point of the hock. The scissors may be used for this.

In banging, the tail should be held up near the root of the dock by placing the arm under it, as it is carried when the horse is in motion. The end is then cut off square, and will remain square while the horse carries his tail properly. If the tail is banged while it is not held up, the end must be cut at an angle, with the hairs next to the thighs the shorter.

The tails grows from 6 to 12 inches in a year. To keep it in good order the hairs should never be pulled out with the comb or brushed out with the dandy; such methods will only break the hairs off.

A tail that has become thin at the end must be continually trimmed off at the very end, and the hairs singed with a match. This will soon cause the end to grow thicker. A good groom will never spoil the tail by breaking the hairs and brushing them out. A dry dandy-brush will soon spoil a good tail.

Docked tails should never be trimmed during the fly season.

Thinning the Tail.—If a tail is left bushy and heavy, it has two disadvantages: it keeps the horse hotter in warm weather, and it is heavier to wield at an offending fly. Length, not thickness of tail, is what a horse needs in the fly season. The lighter the tail, the better will the horse carry it. As with the mane, the thinning or pulling of a tail must be done slowly and with discretion. On no account must the horse be abused by having bunches of hair pulled out by the roots; such practices are contemptible. Some horses that have bunches of hair pulled out object strongly, their tails become sore, and afterwards they are very touchy about the part. This practice must never be allowed.

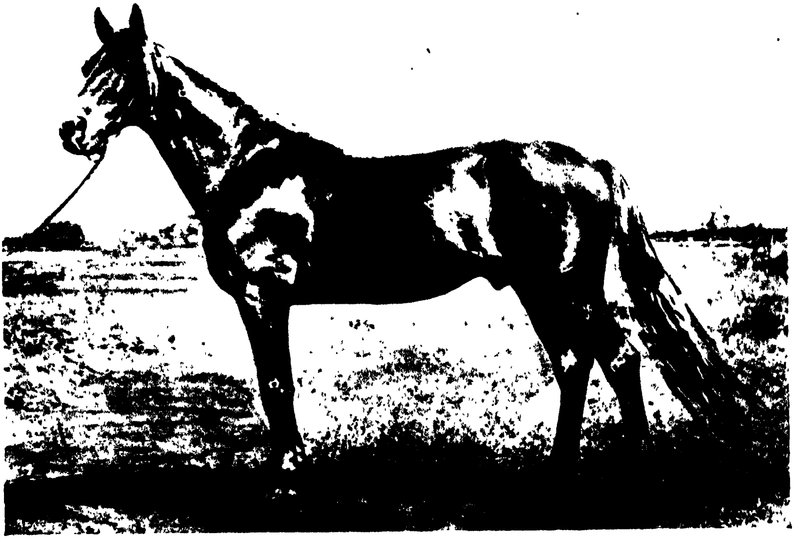
The proper method is to remove each day a few of the long hairs under the tail, near the root of the dock. A few removed each day will soon thin the tail down, and help the horse in hot weather, while greatly improving the appearance of the tail.

If the thinning is done properly from the first, no horse will object and will never mind the tail being handled or touched. (Plate facing p. 210.)

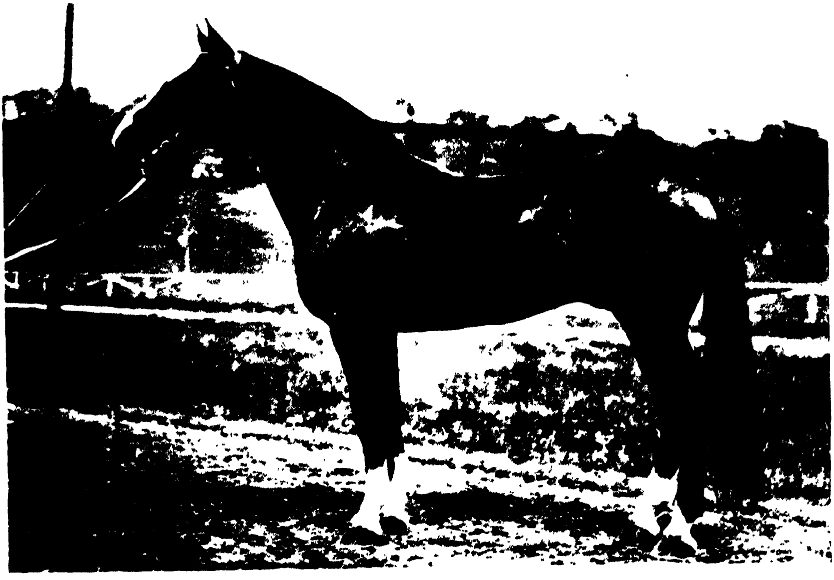
Tail Plaiting.—The tails of heavy horses are plaited for show purposes, or to keep them out of the mud when there are no flies about. There are several ways of plaiting. The hairs can be plaited below the end of the dock, and then brought up and twisted round the tail, just above the end of the dock. (Plate facing p.129.) Or after plaiting, it can be brought up and plaited into the hairs on the top of the tail near the root. (Plate facing p. 160), bay pair. Or the tail can be plaited down the back, all the way (Plate facing p. 145), or only for the top six inches. The latter method gives the appearance of a pulled tail; it cools the horse in hot weather. (Plate facing p. 112, lower photograph.)

Steeplechasers, hunters and light harness-horses often have their tails plaited up in muddy weather. The advantage of plaiting over banging, is that it does not deprive the horse of any length of tail during the fly season. In most places flies are, fortunately, not generally about during muddy weather.

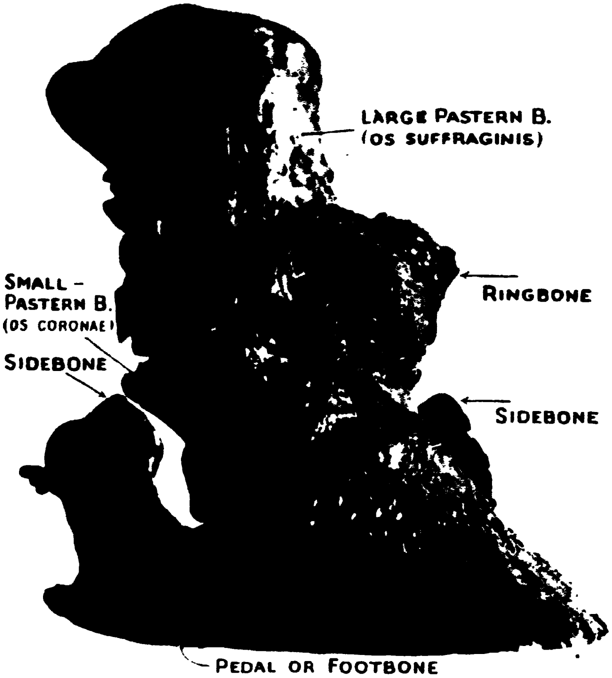
We were lately reminded that "tying up of the long hairs has the effect of keeping the tail clean, whilst not depriving the horse of an ornate instrument for fly destruction and a screen, alike valuable for warmth and decency." As a matter of fact it is much less trouble to clean a very muddy long tail than a muddy leg—and the horse has four legs.



STANDARDBRED TROTTER: ED WINTER

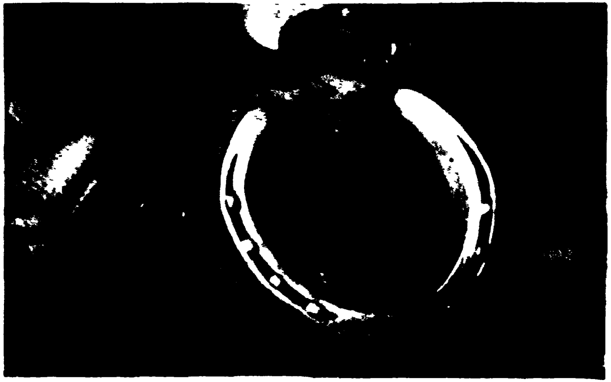


STANDARDBRED TROTTER: JOE PATCHEN



RINGBONE AND SIDEBONES

SPRAINED TENDONS



SOUND NORMAL FOOT

Never plait too tightly and better not to leave up overnight; this may cause hairs to fall out. Never have ribbons tight around the dock. Plaiting below the end of dock is done similarly to mane plaiting, i.e. the under-plait. Wool or ribbons are generally plaited in, which keep the plait in place. In plaiting down the back of the tail the over-plait is used (Plates facing p. 112, lower photo, p. 144 and p. 145 lower left). This leaves a neat ridge down the centre of the tail. The hairs are brushed and dampened. Small locks of hair are taken from each side, under the dock. Right locks with right hand and left with left.

Stand facing the tail. Close to the top of the dock, take a lock from each side and hold both in left fingers, right lock over left. With L thumb push lower lock up centre of tail. Take fresh R lock and pass to lock in L fingers. Take lock pointing up tail into R fingers. With R thumb push locks in L fingers up tail. Take fresh L lock, pass to lock in R fingers. With L fingers take lock pointing up, with L thumb push lock in R fingers up tail. Take fresh R lock and continue thus until plait is as far down tail as is required. Then take the three locks and plait over-hand to their end. A few turns before reaching end plait in the centre of a 2 ft piece of ribbon or wool. Tie the ends of the wool together at the end of the plait. This "pigtail" can be pushed up under the ridge or it can be left hanging. The smaller the locks taken from the sides and the tighter, in reason, the plaits the neater the plait. Do not plait too tight as it will hurt the horse and may cause hairs to fall out. The end of the tail can still be plaited up. (Plate facing p. 176, upper).

Plate facing p. 161, upper, shows a Hackney with the natural tail tied up to the crupper to show off the quarters in the show-ring.

Tail-rubbing.—The tail is usually rubbed near the top on the back. Mares in season often rub their tails. On the train or in a motor, a horse may begin rubbing his tail if it is not bandaged or guarded. Once he starts rubbing it, itching generally follows, which causes increased rubbing. Docking may cause the remnant of the tail to itch. Captain Hayes mentions this in his books.

The first signs of rubbing must be noted and the cause removed, then steps taken to prevent its continuance. Worms, or neglecting to sponge out the dock, may cause tail-rubbing. The same applies to rubbing the mane. A horse may get his head under the manger and do this. (*See* page 202.)

Use of Tail.—General Rimington, in "Our Cavalry," says: "Nature has taught the horse to act in such a way as to utilize the mechanism of his head, neck, body, limbs and tail to the greatest advantage in his movements." The use of the tail in polo and in show-ring jumping is only too apparent to those who have had a wide experience in either.

Unfortunately for the horse, many people think that he has no use for his tail. Apart from its use as a means of balance, it is of great use for protection and warmth as well as for decency, but most of all it is his only weapon against flies over those parts not reached by the fly-muscle (Panniculus Carnosus).

The tail is a continuation of the vertebral column, and consists of generally 17 vertebræ, eight muscles, three arteries, five pairs of nerves, ligaments, fascia and the skin with its glands and hair. The skin at the end of the tail is very thick, as it is from this part that the long hairs grow.

The Panniculus Carnosus, or fly-muscle, lies directly under the skin and covers most of the body, the breast, the upper parts of the fore-legs, the neck (except near the crest) and the face (except on the forehead). Its function is to twitch the skin when it itches or when the horse wishes to remove a fly. It does not extend posteriorly to the hips over the hind-quarters, nor does it exist on the upper parts of the hind-legs, because these parts were intended by Nature to be protected by the tail. So sure is Nature of the use of the tail that a patch of thick fascia is provided over the root of the tail where it cannot reach, and flies cannot puncture this. An undocked tail, when the hair is banged short, will reach over the quarters, but will not reach in between the thighs; therefore the hair must be allowed to grow before the fly season; it should reach nearly to the hocks to give the horse the comfort that it deserves.

The tail is most essential for brood mares when at pasture with their foals. Many a docked mare has injured its foal by kicking at flies while the foal is sucking.

Nicking Tails.—There are occasions when a slight operation on the muscles of a tail under a local anæsthetic will greatly improve a horse. Under such conditions the "nicking" would be justified. A crooked tail, one carried to one side, or one with a kink in it, can easily and almost painlessly be straightened. A horse that has acquired the habit of depressing its tail very tightly can be cured by a slight intersection of the depressor muscles.

In such cases, only a skilled surgeon who knows his anatomy should be employed. A local anæsthetic is necessary. (*See* page 267.)

A double-edged knife should be used and only a small incision made in the skin; the muscle being cut after the knife has been inserted. This leaves a very small wound to heal. The usual antiseptic precautions will be taken (*see* Chapter X), and for a few days, while the inside wound is healing, the tail is gently bent, or even tied for a few hours, so as to prevent the sides of the incision in the muscle from growing together.

In this way tails can be very easily and humanely straightened and prevented from being tightly depressed.

But when such an operation is carried out—and so often by unscrupulous people with no feeling for dumb animals—merely to conform to some new fashion or whim, it cannot be condemned too strongly.

I have witnessed the grossest cruelty perpetrated on show-ring horses, mostly docked Hackneys. The fashionable hat-peg variety of tail is produced by nicking in its most brutal form. After the operation the tail is generally tied tightly right up over the back, until the wound is healed. (Plate facing p. 161.)

The modern show-ring is responsible for a great deal of cruelty and in countries where any feeling for a dumb animal is almost non-existent, the cruelty is aggravated many times.

Undocked horses are also the victims of this barbarous usage. The much-admired, long-tailed saddle-horse (especially the American saddle-horse) has its tail very commonly "set up" or nicked. This is sometimes done to an absurd and grotesque degree. It is very easy to tell when a horse's tail has been set up, and it is quite time that action was taken to stop this senseless practice. It is a deplorable thing that those who show horses should be so willing to be dictated to by horse-copers and stable-hands, who appear to have a mania for mutilation and disfigurement. *Exemplo plus quam ratione vivimus.*

Docking.—*Nam ego illum periisse duco, cui quidem periit pudor.* Living in a country where the docking of horses is confined to a proportion of certain breeds kept chiefly for the show-ring, my intention in dealing with this subject is to show that the practice is a fashion, and not a necessity. Thirty years ago in Canada, one seldom saw a docked heavy draught horse; it was the saddle-horse that was generally so victimized. It was considered fashionable. As soon as the hunter in England was spared its tail, the fashion changed in Canada; now, a saddle-horse that has not a nice tail is worth nothing To-day, the only horses we see docked in Canada are some show-ring Hackneys (a great many of these horses are not docked, but shown with their tails tied up—*see* page 193), and some heavy horses of pure breed that are exhibited at shows. There has been no change in vehicles and methods of using horses at all during this thirty years; therefore, fashion alone has dictated the change. Every horseman in Canada acknowledges that docking is done because it is fashionable with certain breeds; one never hears the worn-out excuses still expounded in England—in many cases by people who really know a good deal better. The general public are very easily deceived in matters of this kind. In the States one rarely sees, even to-day, a heavy draught horse docked. At the National Show at New York all the heavy horses have long tails.

Those who owe the horse so much should do their bit to alleviate, as much as possible, unnecessary suffering and cruelty. The cruelty in England, and to a greater extent abroad, due to the docking practice is perfectly atrocious. Anyone who has seen a small fraction of what I have, would condemn the practice for good.

I have already explained the use of the tail and the fly-muscle. (*See* page 193.)

In the past thirty years docking has gone out of practice a great deal, and it is certain that the majority of those who have to deal with horses will be glad when it is altogether a thing of the past; a relic of bygone atrocities, together with the cropping of ears, etc.

The docked tail shows off the hind-quarters, and this is the real reason for docking. Man allows his better feelings of humanity and fairness to be overruled by those of fashion, appearances and selfishness. It is not in keeping with modern education. Those who know better must be an example to those who are less privileged. No wonder the heathen and infidel races are unable to understand the cruel customs of the Christian nations. (Plates facing pp. 129, 144, 145, 160, 161, illustrate how plaiting shows off the hind-quarters, without resort to docking.)

A close study of art during the past two centuries will thoroughly convince the observant person that docking has always been a fashion, which has declined, become almost extinct, and then returned periodically; no consideration ever having been given for the horse, or the necessity for the tail. At one period, tails would be docked very short, and nicked to represent a kind of hat-peg (not unlike the modern show-ring Hackney); at another, tails would be long and flowing. But these were days when humaneness to animals scarcely existed.

Docking advocates, who in some cases appear to have almost a mania for it, advance any excuse to support the practice. Many of the public believe these excuses through lack of knowledge. It was only when the educated horsemen who supported the action taken by the Hunter's Improvement and Light Horse Breeding Society nearly forty years ago, used their influence and disseminated the truth, that the practice really became unpopular with many of the public.

Humane organizations have done much good; but a large section of horse-people look down upon such organizations on account of their sometime over-exuberance of effort.

Amongst horse-dealers and the like are found men who have no principle so far as treatment of our friend the horse is concerned; they will abuse, mutilate or dope a horse to any extent if they hope to gain financially by so doing. It is therefore most essential that horse societies and organizations should stop cruel fashions; because those people who follow them would not abuse their victims if it was not "the fashion."

It is a very regrettable fact that a few years ago a prominent horse society in England put on record that it was antagonistic to a movement then on foot to prohibit docking. Such action could not but increase the gross and far-reaching cruelty and life-long torture in foreign countries.

Docking advocates are content to remain blind to the cruelties that continue all over the world in the preparation of horses for the show-ring, in classes where mutilation is the custom. A fairly extensive experience with horse-shows has amply demonstrated to me the barbarity of the custom of docking Hackneys and pure-bred heavy horses.

English people who have never lived abroad little realize what the docked horse has so often to suffer. The horrible torture from flies is far worse than the wanton mutilation.

In the past, gross cruelties have been perpetrated in private and sale-stables in the States and elsewhere, in order to comply with this fashion, which originated in England. Space does not permit mention of even a few instances, but I must refer to one, where twenty long-tailed harness-horses were docked and nicked in Chicago, and shown with considerable success by the owner in harness-classes, a few weeks afterwards.

The excuse in favour of docking that it minimizes the danger to the driver, is very poor. No one who has lived in a country where fewer than 1 per cent. of horses are docked, can believe this. The difference in construction of vehicles has no bearing on the case. In fact, Hackneys in England are now commonly driven in American vehicles. Besides, one should "fit the shoe to the foot." The fact that to-day there are well over 20 million undocked harness-horses in North America is sufficient proof that long tails are not a danger. (Plate facing p. 96.)

No harness-horse is properly trained that will not allow its tail to be handled *ad lib.* Just as it is necessary to accustom him to the touch of the traces, so is it to the touch of the reins. (*See* page 90.) In many of the States of the Union docking is a criminal offence.

There are over 15 million undocked farm horsesin the States; yet a British M.P. a short while ago stated that docking was necessary with farm horses to keep the tail out of the mud. The length of the natural dock is about 12 to 15 inches. (*See* Plaiting and Trimming.)

There are hundreds of fours-in-hand in Canada and the States, and outside of the show-ring, where one sees the same artificial teams at show after show, I do not remember ever seeing a docked horse in a team. It is quite common to see a long-tailed hunter or saddle-horse driven lead in a sporting tandem. (Plate facing p. 80.)

I fear that accidents sometimes happen through incompetence on the part of the driver. Why should the horse be blamed for the driver's ignorance?

In Canada and the States accidents with undocked horses are never heard of; and one is generally ridiculed if this subject is approached. I have seen many accidents happen when the horse involved had a docked tail. Unfortunately, there are still veterinary surgeons, who are willing to earn a little extra money, who will persuade owners to have their animals mutilated; although the Royal College in a recent statement, and the leading College in Canada, are decidedly opposed to docking.

In England we sometimes see the two-wheeled tip-cart with the horse harnessed too far back; in such cases, where the cart is built very high, there might be a possbility of the tail getting caught as the cart is tipped back on to the shafts. But it seems that if such is possible, then the construction must be very faulty. We never hear of such things on the American continent.

The example set by the Hunter's Society in stopping docking spread all over the world in an amazingly short period. Yet forty years ago, advocates of docking were most insistent that the docking of hunters and saddle-horses was absolutely essential. (Plate facing p. 32.) And for years docking advocates insisted that polo ponies had to be docked; now practically all are undocked. Polo ponies always have been undocked in India and other parts of the East, and in most of the States. Surely these facts must convince all thinking people that docking is merely a fashion. (Plates facing pp. 225, 240.) I have studied books innumerable and have failed to find any that gave any reason in justification of the docking of horses. The majority of veterinary books condemn the practice.

As regards the operation of docking it is not my intention to horrify the reader by giving instances of what has gone on in the past, and what still goes on to a lesser degree. Whilst one horse might be docked humanely under a local anæsthetic by an experienced man, twenty will be docked in the usual brutal way. After the tail is cut off the end is seared over for about a minute with a red-hot iron.

It is the deprivation of the tail, however, that is the worst feature of docking. A docked tail will not re-grow any more than will an amputated leg.

As regards smartness, the reader should study the photographs in this book, or the pictures of horses one sees in modern books, in sporting journals, or by the masters in the Art Galleries, and consider if the horse is not greatly enhanced in appearance with an unmutilated tail, compared with the grotesque hat-pegs of the show-ring Hackney.

The advocate who says that docking is necessary to save work in grooming need not be taken seriously. A well-kept tail takes a few minutes' care only each day—not one-tenth of the time that it does to groom one leg. The mud in many parts of Canada during ploughing time is very much worse than in England.

An undocked horse does not kick his hind-legs to pieces in the stables, or when outside in the fly season, or go nearly wild if turned out to pasture. A docked horse in a stable in the summer is most aggravating while it is continually banging its hind-legs to rid itself of flies. Much damage is done to legs in this manner.

The tremendous increase in the number of undocked horses to be seen in vehicles in England shows that true British fair play and horsemanship are getting the upper hand.

The action taken by the War Office in forbidding the purchase of docked horses has had far-reaching results. I was judging recently at the Montreal Work-Horse Parade, in which there were 400 horses; there were fewer than 10 docked horses there.

Another matter for thought on the part of the docking advocate is what happens to most of the docked show Hackneys when they cease to be of use for showing. The majority end their days in cheap commercial turn-outs. The hair of the docked tail will never grow more than a few inches; whilst the docked Hackney pony can never get even that.

The numerous cases of bad after-effects from docking have been responsible for many of the leading veterinarians on the North American continent refusing to operate.

I have come across innumerable cases of horses having their tempers ruined by docking, and being made extremely timid around their hind-quarters; and several instances where afterwards a horse was not able to be used in harness at all; and very many cases where horses have had to be re-docked to save their lives, when gangrene had set in. I remember some years ago a hunter being ruined for jumping after it had been docked.

"The Wanton Mutilation of Animals," by Dr. Fleming, C.B., LL.D., F.R.C.V.S., published by the R.S.P.C.A., is worth studying.

The driving excuse could never be applied to heavy stallions. Pure-bred Shire stallions have been commonly docked for many years. Thirty years ago, Suffolk Punch stallions were never docked. Of late, these have been added to the list of show victims. The reason is obvious. As long as one popular breed of heavy stallions was not being docked, the public could not be expected to believe that docking was necessary. So these horses have been forced into line with their unfortunate brethren.

The horse-shows surely should be the means of demonstrating and enforcing the most humane methods, and their example should be one worthy of the highest praise. At present, horse-shows are responsible for a very great deal of cruelty. The moment it becomes unfashionable to show a breed of horse undocked, the docking of that breed will cease. The cases of the hunter, of the polo pony, and of the Welsh pony are sufficient to prove the assertion.

The Hackney with a long tail is really a beautiful animal. (Plate facing p. 160..)

Fortunately, the best horsemen, everywhere, are agreed that the practice of docking has had its day, and the sooner it becomes extinct the better for the horse, for horsemanship, and for the morals of the community. Any cruel fashion that is tolerated by responsible bodies of men must have a bad moral effect on the minds of the growing generation.

The type of man that generally encourages docking is not of much benefit to the horse community at large.

In many parts of the States a good tail adds 20 dollars at least to the value of a horse. Long-tailed, pure-bred Hackneys are quite common. In fact the modern American saddle-horse is practically a Hackney with a long tail. It is one of the most admired horses in the fashionable parks. (Plate facing p. 128.) Even in England, undocked Hackneys are to be seen. Here is an advertisement from a live-stock paper: "Long-tailed Hackney mare for sale, chestnut, 15.2, 7 years, quiet to ride and drive." Though certainly the modern docked Hackney does not look verv handsome under saddle.

The Cavalry Journal, a short while ago, suggested that all docked horses should be taxed. It should be a heavy tax. The incessant wagging of a docked tail is most irritating to watch, and most distressing for the poor horse.

So many experienced horsemen of late have expressed themselves in public as opposed to this practice, that there seems to be little use in dwelling on the subject.

Field-Marshal H.R.H. The Duke of Connaught denounced it in public as a relic of barbarism, and added: "It is a shame to deprive the horse of the tail God has given it." His Majesty The King has set an example to all true Britons by having no docked horses in his stables. The undocked Hackneys shown by the Prince of Wales were always much admired.

The Press in Canada and the States has done great good in eliminating this practice by its open condemnation, and by quoting the opinions of a large number of well-known horsemen.

I have received countless letters of appreciation from horsemen of mark all over the world in connexion with my earlier remarks on this subject, but the limitation of my space does not allow of my even giving extracts from these.

Sir Howard Vincent, in the House of Commons, said: "Docking causes enormous suffering to animals, and it was responsible for a great share of the mortality among the horses in South Africa, through being unable to protect themselves against the flies."

A few extracts from Press opinions, taken from the hundreds that have been published in the past fifteen years, will show that public opinion is changing.

The Rider and Driver (New York): "The Hackneys no longer have tails, but hat-pegs."

The Trotter and Pacer (New York): "The custom of docking has no justification whatever."

The Toronto Daily Star: "Docking is due entirely to the horse-show."

The Field (London): "A barbarous practice. The New World is far in advance of England in this matter."

The Times: "The practice is a most barbarous one, and we cannot conceive how experienced horsemen can approve of it."

Farm Life (London): "Britain boasts of its treatment of horses, yet it allows this abominable fashion."

The docking fashion is responsible for many instances such as this, quoted from the *New York Herald* several years ago: "One of the fastest trotters ever converted into a high-stepper is Dr. Pitsen. He can now be seen daily in Central Park, docked, nicked, heavily shod, and in heavy harness."

Every person who uses a docked horse is an accessory after the crime, and by his or her influence stimulates or encourages the commission of the crime.

Horse lovers should set an example by never purchasing a docked horse, and should endeavour to influence others to do likewise. Dealers and breeders will then cease to dock their horses.

Britain started this wanton mutilation, and it is up to her to stop it. The fact that certain types of horses only, and in certain countries only, are now docked is sufficient proof that the practice is merely a custom or fashion. The fact also that there are over 20 million undocked harness-horses on the North American continent, which include 70% heavy farm horses, affords incontrovertible proof that the practice is unnecessary. Let us do unto others as we would they should do unto us. Is it sportsmanship to mutilate a horse because we think it makes him look smarter ?

Αγει δὲ πρὸς φῶς τὴν ἀλήθειαν χρόνος.

Treatment of Mane and Tail Diseases.—Neglected manes and tails may produce *eczema*, which is an inflammation of the dermis or true skin. Continuous washing, use of cheap, irritating soap, or soft soap, long exposure to rain and cold, or dirt, may cause this disease. The symptoms are: rubbing; hairs becoming matted and falling out; skin becoming thick, hard and inflamed. An application of kerosene oil one part, and water ten parts, thoroughly shaken together into an emulsion, and well rubbed in, should generally cure it. Dick's White lotion rubbed in is a good treatment. In bad cases a 5-per-cent. solution of silver nitrate is recommended. If the cause is neglect, the part must be washed with warm water and castile soap. (*See* page 281.)

A good application for itchy manes and tails is:

Linseed oil	20 parts
Sulphur (powdered)	4 parts
Oil of tar	1 part

Warm together in bottle and shake thoroughly. Rub well into the part, morning and night for three days.

An application of diluted prussic acid is excellent for an itchy skin.

Another application for eczema is: Wash the part well with castile soap, and apply morning and night:

Starch	½ oz., or	15 gm.
Talcum	½ oz., or	15 gm.
Lead acetate	3 oz., or	90 gm.
Camphor water	6 oz., or	180 gm.

For *mange*, wash thoroughly with castile soap and warm water to which has been added 3 per cent. creolin. Then apply this antiseptic solution once a day until the itching stops.

Sulphur and a diuretic, such as nitre or salicylic acid, should be given internally in all cases of skin diseases. Sulphur is eliminated through the skin, and, therefore, is valuable.

Flies.—Flies and mosquitoes are a very serious means of spreading infectious diseases. Everything should be done to prevent their spreading and to destroy them. It is essential that every effort should be made to prevent them biting the horse; it is only common sense and reason that the horse should be left his tail, which is his chief means of preventing the fly-bite. Flies and mosquitoes spread disease by injecting toxin or germs into the blood-stream after they have inserted their proboscis, or tongue.

Malaria, Texas fever and yellow fever are some of the diseases spread by insects. These diseases are caused by protozoa, which are minute animal parasites about the size of a white blood-corpuscle.

The devastating common bot, which lives part of its life in the equine stomach, is the larva of the gad-fly (*gastrophilus equi*).

It has also been established that disease germs (bacteria) are carried on the legs of flies.

Infantile paralysis is spread by the bite of a fly (*stomoxys*). Malarial fever is spread by the anopheles mosquito.

It is absolutely essential to destroy the one or two winter flies that show themselves from time to time in a warm house. Sticky fly-reels should be hung near the ceiling in the light for some weeks after the fly season is over, to catch those female flies, which, if left to live, will be responsible for millions of flies in the next season. During the fly season cobwebs should be left up, as they catch many flies. Cobwebs themselves are quite healthy.

During the fly season, an abundance of sticky fly-papers and fly-reels should be used. They must be replaced when they become dry. Poison pads can be used in places where the dead flies cannot pollute food, forage or water.

Horses well-cared for in stables can be protected to a certain extent by the application of various preparations. Oil of citronella, kerosene oil, or a weak solution of creoline will keep flies away for a time. But the preparation has to be renewed frequently. Or the following can be applied with a small sponge: 1 oz. oil of pennyroyal shaken with 1 pint of rape oil. This must not be allowed near the eyes.

Fly-nets.—These afford good protection to a horse in harness while in motion. Their chief use is to a horse with an undocked tail, as they do not protect a docked horse in between the thighs. They are used a great deal in Canada and the States on undocked horses that are exposed to flies; it saves the horse from swishing his tail about all the time. The net should reach well down on each side and over the quarters. Some of them reach up the neck and are fastened to the head-collar at the poll.

White cotton fly-sheets are used on some farms in the fly season with much success. Fly-nets are made of string or leather.

Fly-whisks are very useful with saddle-horses. It is easy to keep the flies away, or to kill those that settle on the neck or loins. These are made of horsehair, and are attached to a cane handle.

BAD HABITS IN THE STABLE

Other bad habits were dealt with in Chapter IV.

Kicking.—Some horses will kick at night when alone; company will stop this. Other horses will kick in the dark; for them, a dim light should be left burning. The presence of rats or mice in or near the manger will sometimes cause kicking. This habit must be stopped because the horse will damage himself, damage the stable, and disturb the rest of other horses. It can always be stopped. Hanging a tightly packed sack of straw behind the horse, which will swing on to his hind-quarters when he kicks, is often effective. Hobbles are equally so in other cases.

Kicking at other horses in the stable, or at approaching people, can be cured by kindness and firmness. If a horse is hit while in the act of kicking he will generally learn a good lesson. This must be done by an experienced person. Kickers of this type are often made by abuse and roughness in the stable. Kicking is usually more common with mares. Idleness is responsible for much of this trouble. It may be advisable to pad the stall where it is struck. Some horses stop when the noise ceases. Noisy dogs, which should never be kept in a stable, cause some horses to kick.

Hanging a gorse bush behind a kicker may be effective. Every effort must be taken to stop the habit and prevent damage to the animal itself. A loose-box may solve the problem.

Crib-Biting.—This is very injurious and can be stopped if the horse is given plenty of bulk to eat, and lots of work. Hot, stuffy stables, lack of bulk in the feed, and idleness, are the cause of most crib-biting. It is a habit easily spread, therefore the horse should be isolated, unless the stall partitions are high. He should be left preferably in a loose-box with no manger or post on which to bite. He can be fed from a movable box.

Crib-biting and wind-sucking are very similar in character. In the former the horse grabs hold of something, in the latter he arches his neck and swallows air. He may perform a combination of the two. The crib-biter will show by the wear on the incisor teeth the existence of the habit. The wind-sucker will not show this, but will be unduly blown up in the flanks; and will emit an abnormal amount of wind. Colic and indigestion are frequently caused by these habits.

The best means of prevention, besides those mentioned, is to fasten a two-inch strap fairly tightly round the neck, just behind the throat; this prevents the horse swelling his throat and arching his neck.

Horses at pasture will quit the habit, but resume it on return to an idle existence. Giving sugar as a tit-bit in the stable may teach the habit of licking and then of wind-sucking.

Crowding in the Stall.—Careless handling, roughness during grooming, saddling or harnessing, and other abuse, such as stealing the feed, are the chief causes. Horses kindly treated will never acquire this habit. It can be cured by kindness. A firm, determined horseman can soon cure a horse thus addicted, which, if neglected, may cause considerable harm to someone. A horse will seldom do it to one who shows no fear and yet is sympathetic.

Weaving.—This habit is undoubtedly due to an affection of the brain; and there is but little question that one horse may pick it up from watching another do it. Care must be taken to prevent any such means of spreading it, because a weaver will never look fit, and will deteriorate rapidly. The same conditions that produce crib-biting will tend to cause weaving. Some horses weave constantly, others only at feeding time. A bad weaver gets no rest, and is therefore unfit for hard work. He should be given plenty to occupy his attention in the way of long hours at easy work, and stabled in a loose-box with plenty of bedding. When idle he should be allowed to run about outside. A bad weaver rocks his whole fore-hand as he weaves his head from side to side. Plenty of bulk must be given in the feed of a horse addicted to this habit.

Biting.—Giving sugar or other tit-bits on entering a horse's stall may lead to the habit of snapping. Gently thrusting a small piece of hot meat, or a rag dipped in asafœtida, at his mouth, may teach the horse a good lesson. Teasing or other bad handling is often a cause of this habit, which can easily be cured by firmness and kindness. A horse badly spoilt may have to wear a muzzle for a time while being groomed, until he is cured of the habit.

Halter Pulling.—Fear is the cause of this. The fear must be removed, and the horse allowed to become accustomed to his new surroundings. He must also be tied so that he cannot get loose. He can be tied to a neck-strap; or the rope can be passed through the halter-ring, and then tied round the neck with a non-slip knot. Another way is to tie the rope round the horse's girth (body), and to bring the end forward in between the fore-legs, through the head-collar ring, to the manger.

Tearing Clothing.—Stallions sometimes acquire this habit, and it is not easy to cure. Daubing the parts with a liquid with an objectionable taste, such as asafœtida—may answer. A leather flap, fastened to the head-stall, that hangs down behind the lower lip and chin, may be effective. It may even be necessary to use a muzzle. Idleness is the chief cause. Plenty of bulk and salt should be given.

Gnawing Wood.—Gnawing or licking the walls and chewing the wood usually show acidity of the stomach or lack of salt. Give plenty of bulk, protect the wood with tin or creosote, and attend to the horse's diet.

Eating the dung shows a similar condition, and must be cured at once by giving the horse a good alterative. (*See* page 61.)

When a Horse refuses to lie down.—A horse that will not lie down at night cannot get rest and will soon lose condition, and his legs will suffer greatly. A young horse, on account of his head being tied, or because of the narrow stall, after the freedom of the field, may be afraid to lie down. As a rule this fear soon passes and the horse will lie down. If he does not do so after the first night, action must be taken. A plentiful supply of bedding and sufficient head-rope are essential. A loose-box, of course, is always preferable.

Old horses sometimes will not lie down at night. This may be due to stiffness of the joints. A horse that has got cast in the stall may be afraid to lie down. The cause, if possible, must be ascertained and removed. The horse should be put in a loose-box with plenty of bedding and left untied day and night. A few hours' run outside will often nimble up stiff joints, and entice an old horse to lie down afterwards.

CRUELTY

Δράσαντι γάρ τοι καὶ παθεῖν ὀφείλεται.

Queen Victoria stated: "No civilization is complete that does not include within its sphere of charity and mercy the dumb and defenceless of God's creatures."

In almost every country abroad there is to be found some form of society for the protection of animals; in nearly every instance these are organized and run by British lovers of animals, or by Americans descended from British stock. It is a strange fact, but it is true. It is deeply regrettable that many races take little or no interest in the humane treatment of animals.

The basis of permanent, true and lasting civilization is the proper education of the young. If they are not taught humaneness to animals, how can they be expected to treat fellow-men unselfishly and humanely?

Prevention of, and not punishment for, cruelty is the principle to aim at.

Wanton cruelty is easier to check and prohibit than cruelty inflicted through ignorance. But the existence of the former must have a marked effect on the progress made against the latter.

Sixty years ago there were fewer than ten humane societies in the world; now, there are thousands. By teaching kindness to animals they are forming a basis for the reception of a higher Christian civilization.

The nation that considers the teaching of humaneness to animals as no part of its duty will never progress. A study of fairly modern history and progress in the last century will convince one of the truth of this.

Magistrates, on the other hand, would do much good by imposing far heavier fines or longer terms of imprisonment for cases of cruelty. They are generally much too lenient. It is the duty of every citizen to endeavour to prevent cruelty whenever he sees it, or to report cases to the proper authority. Too many people seem to think that it is not their business.

Humaneness to the horse means a saving of huge sums of money every year. This would materially affect the financial position of agriculture and the farmers.

It is to the two English-speaking nations that we must look to set an example to the rest of the world in banishing cruelty and educating the people to treat their animals, especially their beasts of burden, humanely. There are, of course, many individuals of other nations who have just as strong feelings.

Knowledge alone does not make men better, but kindness does. Knowledge confers power, and kindness prevents its evil application.

General Sir F. Fitzwygram in his book says: "It is justly said to be the type of highest Christian virtue to do good to those who cannot repay and who cannot repay you; then there can be no higher virtue than the alleviation of animal pain and suffering."

The horse is undoubtedly the most unfortunate of animals. He is the victim of endless labour and fatigue, of endless and merciless cruelty, and the older he gets, instead of his trials becoming easier, they become harder. Ruskin said: "Can any man account for all that happens to a cab horse? Has he ever looked at the fate of one of these beasts as he is dying? Has he ever measured the work it has done and the reward it has got? Yet the fate of the horse is no dream."

Other domestic animals live a lazy existence and never have to suffer as do the equine beasts of burden.

CHAPTER VIII

STABLE CONSTRUCTION AND SANITATION

THE **Circulatory System.**—The use of fresh air must be understood if proper ventilation is to be maintained in the stable. Blood is the food of the living tissue; it carries protein, salts, oxygen, etc., to the cells of the tissues. Oxygen is very soluble in a liquid known as hæmoglobin. The red blood-corpuscles (erythrocytes) contain a large amount of this liquid. In the horse these corpuscles measure one 5,000th of an inch in diameter. They pick up the oxygen from the air in the lungs, and when they reach a body cell, in which the oxygen is at lower pressure than in the corpuscle, some of it is given up. They eventually return to the capillaries in the lungs void of oxygen, which gives the blood a blue colour.

There is a double circuit of blood in the body; one through the lungs, the other through the body. The heart is a double pump, which is divided into left and right sides; and each side is divided into an upper, receiving, vessel (auricle) and a lower, pumping, vessel (ventricle). The left ventricle forces the red blood into the large aorta, and into all the arteries and capillaries throughout the body, from which it returns as blue blood (venous) by the veins and pours into the right auricle. The lymph-vessels empty the nourishment that they have collected from the intestines into this venous blood en route. It then passes through a valve into the right ventricle, which forces it through the pulmonary artery into the lungs, where it is resupplied with oxygen, and becomes bright red again. From the lungs, through the pulmonary vein, it pours into the left auricle of the heart; then passes through a valve into the left ventricle, and so on. It will take a number of beats of the heart for a drop of blood to complete the circuit.

Respiratory System.—Air contains 21 per cent. oxygen by weight, nearly 79 per cent. nitrogen, about one 20th of 1 per cent. carbon dioxide (carbonic acid gas), and a trace of ammonia gas, etc. At every inhalation, air is taken in through the mouth and larynx into the lungs, which consist of a bronchial tube for each lung, and tubes branching off in all directions as they diminish in size, similar to the branches of a tree, until eventually they end in a minute air sac. The surface area of these sacs that is exposed to the air in the horse is well over a thousand square feet. At each expansion the volume of the lungs increases by only one-seventh. The expansion is caused by the diaphragm contracting, and drawing away from the base of the lungs, and the ribs moving forwards and outwards. The venous blood, as well as collecting a supply of oxygen, gives up some carbon dioxide, which passes out into the used air, when the horse exhales. This CO_2 is a waste product from the body.

It will therefore be quite clear why the air inhaled should be as fresh as possible, and why the air exhaled should be got out of the stable as soon as possible.

Ventilation.—From physics we learn that warm air is lighter in density than cold, because the former is expanded. Therefore warm air will rise above cold air. This is the principle of circulating the air in ventilating a stable, which allows the warm, impure air to pass out at the top of the building, and fresh, cool air to enter at a lower place. If this system does not function almost continuously the air in the stable will become insufficiently supplied with oxygen and too heavily laden with CO_2.

This would seriously impair the horse's health; and if the percentage of CO_2 becomes as high as one-half-per-cent. it is a dangerous atmosphere for a horse to live in. When the impure air passes out into the open air it soon recovers its normal state. The trees and plants are responsible for transforming the carbon dioxide back to carbon and oxygen.

Experiments have shown that to maintain good health and keep the horse free from draughts, the cubic capacity for each horse in a stable should be 1,500 cubic feet. Thus, if for each horse a stable is 12 feet high and 6 feet wide, it must be 21 feet across. It is quite obvious that there are many stables that have not this amount of space. It is further found that the air in this space should be replaced every twenty minutes.

Although carbon dioxide (22) weighs more than air (14·43) when both are of the same temperature, when mixed with the used warm air from the lungs, it is sufficiently light to rise rapidly to the roof unless the air in the stable is very hot. This is an important point —the temperature of the stable. Further, if the foul air, on reaching the top, cannot get out, it will cool down and eventually fall, and be re-breathed. Many horses are daily having their health impaired by insufficient ventilation of their stables.

The outlet for the impure air must be in the roof, and must be sufficiently large.

It is just as important to have a proper inlet for the fresh air; otherwise the fresh air will force its way in under the door, etc., and cause draughts, which should always be avoided.

Or it may even be compelled to come down through the ventilators in the roof, and cause a draught on the horses.

The ventilators should be constructed so that the wind and rain cannot beat in on the horses. The louvre-board variety, placed at the top of the shaft that passes right up through the roof, is best. Stables are better without low ceilings, but if such exist, the ventilating shaft must pass right through the space above the ceiling. It should be impossible to close these ventilators entirely, as by so doing, grave dangers would be involved. A good system is to have the louvre boards controlled from below, so that in bad weather they can be turned well down.

Insufficient ventilation will produce most disastrous results. Sixteen horses and a dog were found dead in a stable in Alberta after a very cold night. The stable was newly-built, without a ventilator or inlet; the moisture from the horses' lungs condensed on the cold walls (wood) and formed ice, sealing up all the cracks. The animals were suffocated. Seventeen horses out of nineteen that were being transported in a closed box-car in Canada in the summer, with one door open only a few inches, were suffocated between two inspections, only about an hour apart. In each case, of course, the catastrophe was the result of lack of a proper knowledge of ventilation.

The fresh-air inlet can be through the windows; in which case they should be situated on the wall in front of, and well above, each horse; they must be hinged at the bottom to open inwards, and have flaps at the sides to prevent the cold air falling round the sides of the windows. The fresh air should pass over the tops of the windows. These windows should be on both sides of the stables, so that, in cold or very bad weather, they can be closed on the one side only. All the windows must not be closed at once, unless there are other means of allowing an inlet. These windows should be about 18 inches by 12 inches high for each horse.

Pipe air-inlets can be brought up the wall to 6 feet above the ground, connecting at the bottom with the outside, such as are commonly used in modern offices and factories.

These may be constructed in the stall posts at the back of the stalls. These inlets should be constructed so that they cannot be closed. An opening of 6 square inches per horse is necessary, if there is no other means of inlet for the fresh air.

Grooms have a very bad habit of closing up means of proper ventilation; so precautions must be taken to prevent this. They like to see the horses warm, it helps to make the coats shine, but fresh air and cool stables are essential for healthy horses, and for the groom.

A properly ventilated stable should not smell stuffy, or too strongly of horses, upon entering.

Stable Impurities.—The presence of carbon dioxide has already been explained. (*See* page 210.) The urine decomposes into ammonia gas (NH_3), and several ammonia salts and acetic acid.

The dung consists chiefly of insoluble substances, such as cellulose, which have very little effect on the impurity of the air. It decomposes into ammonia compounds, lactic acid and carbolic acid.

Fresh urine contains no ammonia, but ammonia bacteria rapidly cause it to ferment; the urea combining with the water, and forming ammonium carbonate ($CO(NH_2)_2 + 2H_2O = (NH_4)_2CO_3$). The ammonium carbonate is again split up into water, ammonia gas and carbon dioxide ($(NH_4)_2CO_3 = H_2O + 2NH_3 + CO_2$).

Ammonia has a very bad effect upon the eyes and lungs of the horse; it also destroys leather by dissolving the fat contained therein; further, it has a detrimental effect upon paint and varnish. Hence the importance of good drainage to carry the urine away as soon as possible; and of the daily flushing of all drains and stalls.

Dung, when mixed with an alkaline fluid, such as ammonia, produces a compound that dissolves albumen and mucin, of which the horse's hoof is chiefly composed. Hence the importance of not allowing the dung to get soaked in the urine, and where such can take place, of picking out the feet two or three times a day; and of keeping the feet as dry as possible in the stable. The hind-feet of mares will, therefore, require the closest attention.

Stable Site.—A stable should be built on dry ground, that allows of good drainage around. High ground is preferable to low-lying; and the sunlight must not be obstructed by other buildings or trees. Pure air is essential, and facilities for the installation of a proper drainage system and water supply. Prevailing winds must be considered in laying out the plans. A sub-soil of gravel or sand is best; next to these come rock and limestone.

The foundations must be strong and deep enough to ensure solidity. They must be protected from rising damp by layers of pitch or other material.

Stables are better isolated from other buildings. It is desirable that the longer sides, where the rows of windows are, should face the east and west, so that both sides get some sun.

Ivy and creepers that harbour insects should not be permitted on the walls.

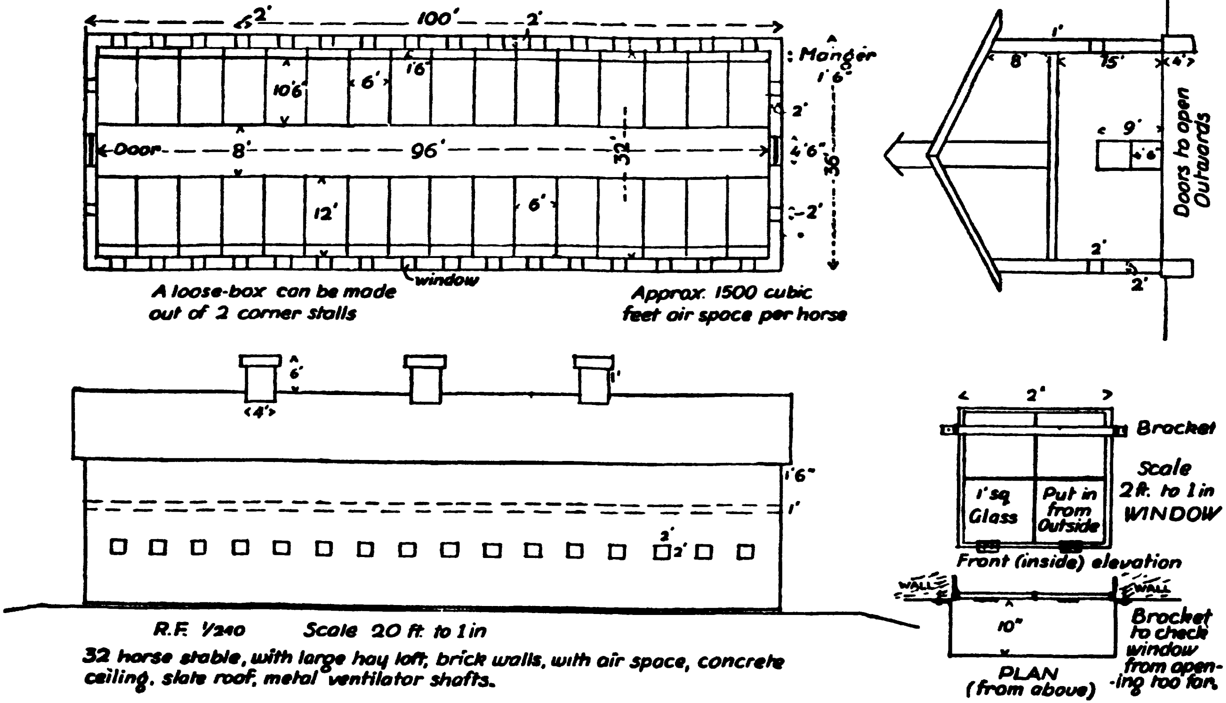
Horses do not do well in damp stables. Dampness favours disease germs, and causes rheumatism, debility, etc.

Light.—It is essential that stables be constructed with sufficient windows to light fully every part of them; trees or other buildings must not prevent proper lighting. Abundant light is necessary for the horse's eyesight. He cannot be expected to have good eyesight unless kept in a well-lighted stable. Dark stables are responsible for shying. (*See* page 40.) Sunlight is also the greatest enemy to disease-producing germs and other forms of filth; it is also necessary for the groom to be able to see to do his work thoroughly. Any careless work can at once be spotted in a well-lighted stable.

For dark evenings, early mornings, and night work, the stable must be well lit with electric light. The lamps should be near the ceiling. The fittings should be those specially designed for stables, and the wires should be laid in metal conduits. Switches should be out of reach of passing horses, and of the kind made specially for stables. (Plate facing p. 210.)

Roofs.—Sloping roofs without ceilings are far cheaper and allow for more air-space; but a high ceiling is preferable, as it is more easily kept clean, and there is less danger of condensation in very cold weather. Without a ceiling the stable becomes hot in summer and cold in winter. The ideal ceiling is made of ferro-concrete, as it is fireproof. Unless the ceiling is fireproof, forage should not be stored above it. Wooden shingles, tar paper or other inflammable material should never be used on a stable roof, but slates, tiles, or metal shingles.

Walls.—A stable wall should be fireproof; it should be made of brick or concrete, or steel and terra-cotta. With the latter, or with brick, an air space is most essential, and is easily constructed. Concrete can be constructed with an air space, but this is not usual. The air space keeps the stable warm in winter, and cool in summer, A pipe 4" in diameter comes up at the back of each horse (i.e. by stall post) to a height of 6ft., to admit fresh air



A loose-box can be made out of 2 corner stalls

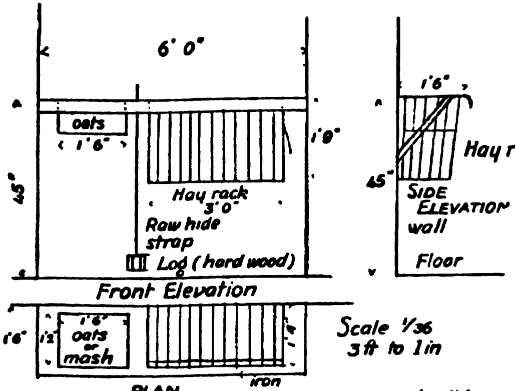
Approx. 1500 cubic feet air space per horse

Scale 2ft. to 1in WINDOW

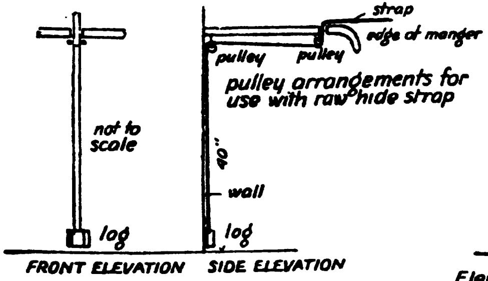
Bracket to check window from opening too far.

R.F. 1/240 Scale 20 ft. to 1 in

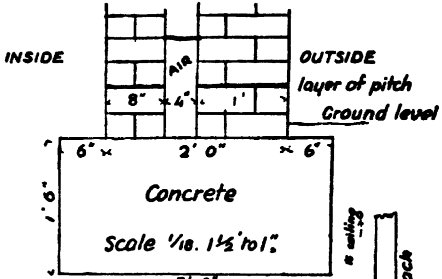
32 horse stable, with large hay loft, brick walls, with air space, concrete ceiling, slate roof, metal ventilator shafts.



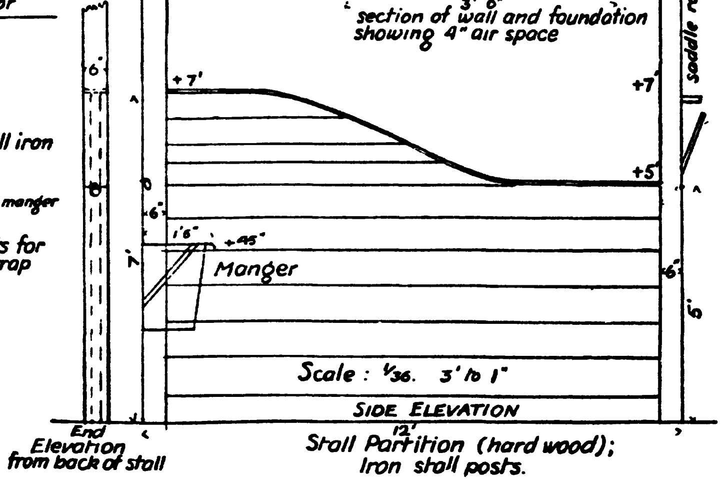
Movable oat bowl and sanitary hay rack, all iron



pulley arrangements for use with raw hide strap



section of wall and foundation showing 4" air space



Stall Partition (hard wood);
Iron stall posts.

and prevents condensation on the inside walls in very cold weather; it also keeps the stable dry in damp climates. Where there is an air space in between the inner and outer walls, ventilating bricks must be provided in the outer wall about a foot above the ground, with another row near the roof. The inside wall should be lined with smooth tiles or glazed bricks. These should be "pointed" with cement. This allows of scrubbing and aseptic precautions. If made of ordinary bricks, they should be lime-washed every six months, and once a month round the mangers; or they can be painted with ordinary oil-paint.

Smooth concrete or plaster on expanded metal is more satisfactory than brick. The concrete or plaster can be painted and scrubbed periodically. The colour should be white or cream.

Walls should be 12 feet high, and must be damp-proof.

Doors and Windows. (*See* page 214.)—Window-frames and casements should be of metal, and thus fireproof. The glass must be fastened from the outside to prevent any possibility of its falling on to the horses.

Doors should open outwards, and should be divided into an upper and lower half. The lower half should be about 4 ft. 6 ins. high to prevent a horse attempting to get over. Doors should be 4 ft. 6 ins. wide.

The total height should not be less than 8 ft. 6 in. The bottom half should have a strong bolt to keep it closed. Doors should be made of hard wood; and in fireproof stables they should be covered with sheet metal.

The latches should be such that loose horses cannot operate them; but doors must be easily opened, in case of fire. In old stables in Canada, double doors are sometimes used in winter. In this case the inner door must open inwards, but it must fit easily, so that it can be opened in a hurry, if necessary. This will be removed in mild weather.

With thick hardwood doors a double door is not necessary. Provision must be made at the bottom to prevent rain and cold air beating in under the door.

On coach-houses, where large doors are necessary, sliding doors hung on wheels are convenient, and if well constructed are easily operated. Heavy doors on hinges are liable to drop.

Fly-screens should be fitted to all windows where flies are bad; these should be taken down in the winter. They should be fastened on the outside of the casement. Screen doors can be fitted inside the stable door, to open inwards. They should have a spring to keep them closed normally, and a hook to keep them open when a horse is passing. The screening should be fine mesh wire netting, specially made for protection against flies.

Floors.—These should be constructed of granite setts, stone slabs, concrete, bricks, asphalt, creosoted wood blocks, cobblestones or floor tiles. The last are made about 4 inches square with bevelled edges and a groove down the centre, which presents rectangular blocks about 4 in. by 2 in. If concrete is used, it must be grooved to prevent slipping, and have a rough surface. Concrete does not wear very well and becomes more slippery with wear.

The stalls must be grooved or have the tiles or bricks laid to allow for free drainage.

The slope in the stall from each side to the centre should be 1 in 36 (1 in. in 3 ft.), which means a 1-in. drop in a 6 ft.-wide stall. The slope from front to rear should be 1 in 80; a drop of about 1½ in. in a stall 11 ft. in length. Greater slopes give discomfort to the horse, and may cause slipping.

The gangways between the rows of stalls, or behind a single row, should be level, unless surface drainage is used; and the tiles should be laid with grooves across the passage. Floors must be at least one foot higher than the outside ground, and if built on to the ground, must have about 2 feet of concrete and stones as foundation.

The approaches or ramps leading up to the stable doors should be of a very slight incline, be of similar material to the floor and non-slipping. They must be wider than the door. Ramps leading to upper stories must be fireproof and should not be steeper than 1 in 4, and good footing must be provided. Old rubber fire-hose, fastened crossways, makes the best footing for steep ramps.

Wooden floors are insanitary and must be sprinkled daily with creolin solution. Well-built stables, with plenty of bedding, keep the horses quite warm enough in the coldest of winters, with tile, concrete, or similar floors in the stalls; but stables that are not well built, that have concrete or such-like floors, may have wooden stall-floors put in for the winter. These are made in two sections to fit lengthways side by side in the stall, and must be raised by cross slats an inch off the floor to allow for drainage. They should be taken up once a week and the stall flushed down with creolin solution.

In stables constructed with wooden floors, great care must be taken to inspect the stalls, especially when the horses have calks on their shoes. A hole in the floor, or a weak plank may cause a broken leg. The safest plan is to build the floor of 2-in. or 3-in. planking, and to cover this with a 1-in. board, which can be replaced when worn through. These floors must be kept as dry as possible.

Much unsoundness in horses is caused by their spending more than 75 per cent. of their time, in many cases, standing on a hard floor. A breast-line out in a soft-ground yard or field, is most useful when the weather permits. Horses can even be groomed when tied out in this manner.

Coach-houses and Harness-rooms should be dry and airy, and be constructed in a manner very similar to the stable. The windows should be much larger, and there need be fewer of them. The ventilation must be good; and the temperature about 65° F. Unless this is attended to, carriages will become mouldy and harness and saddlery spoilt. There should be a fireplace in the harness-room to dry equipment when necessary, and for cooking hot feeds, etc.

Drainage.—The drainage of the stall has been explained. Surface drains are cheapest and most easily kept in sanitary order. They must run along at the back of each stall, and should be half-round pipes or grooves in the concrete; they should not be too deep, otherwise the horses may hurt themselves when they step in them. The floor of the gangway must in this case slope about 1 in 80 from one end to the other, or from the centre to either end.

If buried drains are used they must be constructed on thoroughly sanitary lines, otherwise they are a danger. The drain for each stall is better at the back in the centre; those in loose-boxes, in the centre. These must be covered by a strong non-slipping grating.

Where the drain runs into the outside sewer or drainage pipe, there must be fitted a perfect type of gully-trap, to prevent foul gases getting back into the stable. This trap should provide for the collection of solid matter washed down from the stable, which must be cleaned out when necessary.

After the bedding has been taken out to air in the morning, the stalls, floors and drains should be washed down with a 2-per-cent. solution of creolin and a hard stable-broom.

Litter-shelters are necessary to allow for the proper drying and airing of the bedding daily. In towns, wire cages are used; but where space is not limited, concrete, metal or wooden racks, with a sloping shelter over them for wet weather, should be provided. The sun and fresh air must have access to these.

Heating.—Stables must never be too hot; nor should they be very cold, but the latter would be more healthy than the former. They very seldom require artificial heating. If horses are properly rugged, their own heat will soon warm the stable. There are stables that are poorly constructed, containing a very few horses, that may be so cold when properly ventilated as to necessitate artificial heating. Hot-water pipes are the best for the purpose. The heat is easily regulated. The temperature of the stable should be between 55° and 60° F. Stuffy, hot and ill-ventilated stables are most injurious to horses, as well as to those who work in them.

Stalls and Boxes.—Work horses fare quite well in stalls, which should be at least 5 ft. 6 in. wide, and for large horses 6 ft. wide. Idle horses are much better in loose-boxes that should be 12 ft. wide. For Thoroughbred colts they are better if 15 ft. There should always be at least one loose-box in a stable for a sick horse.

The length of the stall should be 11 ft.

The gangway, in between a double row of stalls, should be 8 to 10 ft. wide; and 6 ft. where there is only a single row.

Partitions should be made of hard wood, as oak or hard maple, which is almost fireproof. These should be painted; and scrubbed periodically. Partitions should be solid and extend up high enough in front to prevent horses fighting, that is to say from 6 ft. 6 in. to 7 ft.; and be about 5 ft. high at the back of the stall. Loose-boxes should have the upper 2 feet of at least one of the sides made of open railing. The sides should be 6 ft. 6 in. high.

The tops of the stall partitions and loose-box sides should be of metal or metal covered.

Heel-posts (at the rear of the stall partitions) should be of iron. Rings for the pillar-chains should be attached to these, 5 ft. from the ground.

To prevent the spread of contagion the partitions should extend right into the wall, and should be fitted securely into the floor.

Where expense is no object all horses are better in loose-boxes. These are best constructed each with its own door (in two halves) leading to the outside, as is common in racing stables.

The door of the loose-box should have a very secure bolt or catch, which cannot be opened by the horse, but which can readily be opened in emergency.

To prevent horses getting loose at night when they slip their head-collar (halter), it is a good plan to hang a chain or rope, or place a bar, behind the horse across the heel-posts. Some modern stables have rods that draw out for this purpose.

Mangers.—These should be made of iron, which is strong, will last a life-time and is perfectly sanitary. They usually consist of a broad, deep shelf with the front bent down, in which is a wide, flat-bottom receptacle for the grain and hot feeds, and a rack for the hay. The feed receptacle is best when it is removable, so that it can be more easily cleaned. It must be constructed so that the horse cannot knock it up; this is the chief objection to a movable feed-bowl. The larger the bowl the less chance of the horse bolting his oats. Overhead hayracks are not satisfactory, particularly those that are fed from the loft above. They are dirty, and cause dust and seeds to get into the eyes, ears and mane. The hay-rack should be roomy. The bars must be close enough together to prevent the horse's foot or knee from being caught.

Wooden mangers are not sanitary, and become rapidly damaged by the horse nibbling at the wood. The edges can be protected with sheet metal; but this so easily becomes jagged or bent up that careful watching is necessary.

Some horses have the habit of knocking their knees against the manger. It may be necessary to fit a wooden partition in under the manger, and to pad it heavily to protect the knees.

Horses that get their heads under the manger and rub their mane (generally caused by a dirty mane), can be prevented from doing this by means of a similar partition under the manger, so that it slopes diagonally back to the base of the front wall.

A ring is usually provided on the wall above the manger to be used when the horse is on the short-rack, for grooming, etc. If there is any risk of an unprincipled stableman or groom leaving a horse on the short-rack at night, these rings should be cut off. But a man suspected of such dishonesty should be got rid of.

Water-troughs.—These should be of iron, with cocks for proper emptying; and be filled from taps on which horses cannot catch their halters while watering. They should be emptied and scrubbed out once a day. Buckets should never be dipped into the trough, but filled from a separate tap. In cold weather, where the trough is in the stable, it should be filled some time before watering, to allow the water to warm a little. Where the trough is outside, it is best to fill it just before watering and to empty it before it freezes.

If water is before a horse all the time, it should be provided in a separate basin or trough for each horse, and the water should be changed frequently. The principle of having a stream of water running in front of a row of horses must not be allowed, because it is a sure way of spreading disease.

The Loft.—Hay and straw should be kept in a separate forage shed, and never in a loft over the stables, unless the stables and ceiling are fireproof.

Oats and bran must be kept where rats cannot get at them. In ferro-concrete stables, bins for grain, bran, etc., connecting to the stable below, are easily constructed.

Improvements to old Stables.—Badly-constructed stables can be greatly improved by having proper windows and ventilators fitted, and drainage and new flooring put in. Sanitary mangers and other fittings can be installed without much expense. Ample fresh air, light and good drainage are essential. Bad stabling is responsible for many sick horses. Work horses stabled in insanitary stables may not get sick, because they spend so much of their time out of them, but this is no excuse for having such conditions. Poor stabling is unsound economy.

Precautions against Fire.—Stables should be made of brick walls, ferro-concrete ceilings or roofs, and metal fittings with hard, wood partitions to stalls. The floors must be fireproof. Should a fire start it cannot then spread far. In very large stables there should be separate rooms protected from each other by fireproof sliding doors. Electric wiring and fittings must be well installed, and fireproof. Fuses must be in metal boxes. Smoking must never be allowed in the stable or forage rooms. Stables with two or more storeys must have fireproof ramps or chutes leading to each storey. Elevators as the sole means of exit must never be permitted. Elevator shafts are a grave means of spreading fires.

There should be plenty of reliable fire-extinguishers in the stable. The large brass cylinder type that is actuated by being inverted is most satisfactory. It needs recharging once a year, and should be periodically opened. The inner glass bottle contains concentrated sulphuric acid; the cylinder contains a strong solution of sodium carbonate. When these are combined by the inversion of the cylinder, carbonic acid gas is produced.

Slings.—It is a good plan to have a strong ring fastened to the ceiling, or to a girder beneath the ceiling over one of the stalls in a stable, in case slings are needed in an emergency.

When a horse is put in slings, it is often advisable to assist him by having a temporary low partition put in the stall to reduce the width of the latter nearly to that of the horse. Blankets should be fixed on each side to add to the comfort of the horse.

Riding-school or Manège.—As these are fairly costly, the size greatly depends on the available funds. A school should measure 50 ft. by 100 ft. For training a big class, or for schooling over a full course of horse-show jumps, the school must be 100 ft. by 200 ft. The Olympia, or "A" course, covers this area. The walls should be 20 ft. high, and the roof have sufficient slope to provide plenty of air space inside. Ample windows, at least 6 feet above the ground, and electric light for night work, are essential. Good ventilation must be provided in the roof. In hot weather some, at least, of the windows must open. A lean-to shed to hold jumps and wings should be provided at one end. Large, wide doors are necessary for the entrance.

The floor is important. Tan bark is commonly used, but is expensive, very dirty, and requires a great deal of watering and raking, while the red dust is very injurious to man and horse and spoils clothing. Tan bark is most injurious to horses' feet. In frosty weather it gets hard. Salt should not be used in a school, on account of its injurious effect on the hoofs. Two parts of sand to one of sawdust has proved satisfactory in many places.

By far the best flooring is a loamy-clay, of just the right mixture to allow rolling; it does not get hard, and offers at all times a perfect footing. Such a floor is used on top of the concrete at the National Show at New York; also at Ottawa and Montreal, and I know of no better footing for jumping. It requires heavy rolling after severe use, and is raked daily. It helps to keep a floor in good condition by having the droppings removed daily.

In very cold weather a 5% sol. of Calcium Chloride sprinkled on the floor will prevent freezing.

CHAPTER IX

THE FOOT AND SHOEING

THE structure of the foot must be understood if the horse is to be shod in the most economical and efficient manner. Lameness is generally in the foot, and in the majority of the cases is due to faulty shoeing. The horse is of no use unless he can use his feet; it is therefore of the greatest economical importance to study this subject; one in which very much lack of sound knowledge is being continually displayed.

Shoeing was probably known 200 B.C., as a coin found near Brindisi depicted a horse being shod. The Gauls and Celts shod their horses in a manner similar to modern methods. Many shoes and nails have been discovered amongst ancient British and Roman remains in Britain. These indicate that the horses' feet were small.

Structure of Foot.—The foot consists of the hoof and its contents; the coffin bone (os pedis), navicular bone (os naviculare), the lower end of the small pastern bone (os coronæ), the lower ends of the flexor pedis perforans tendon, and the extensor pedis tendon, the ligaments of the joints, the synovial membrane, blood-vessels and nerves, the lateral cartilages, sensitive laminæ, sensitive sole, plantar cushion and sensitive frog, coronary band and the perioplic ring. The horny box that encloses all these vital structures consists of wall, sole, frog, and bars. The wall is divided into toe, quarters and heels. The bars are a continuation inwards, towards the apex of the frog, of the walls at the heels. These do not meet at the apex by about half an inch. (*See* Plate facing p. 193, and the Illustration on p. 225.)

Wall.—The outside is covered with a cell-like skin (periople), which grows downwards from the perioplic ring, and prevents the drying up of the hoof, a condition that would produce brittleness. It must therefore never be rasped. The hoof grows downwards from the coronary band, and takes a year at the toe, and six months at the heel to grow the length of the foot. The wall is thickest at the toe, and thinnest at the heel, to allow for elasticity.

The inner wall is thicker and more upright than the outer. The thick toe is necessary for wear and for propulsion. The horn at the heel is also more pliable owing to its containing more moisture. The horn is composed of minute fibres that extend downwards and forwards (the direction that a quarter-crack runs). The outer part of the horn is harder. If the coronet is destroyed or damaged, the hoof below will not grow normally, but a temporary structure will be produced. The temporary structure that grows below a damaged part of the coronet must not have nails driven in it; it is of softer horn, and is secreted by the sensitive laminæ. It is an extra growth of the "white line." (*See* below.)

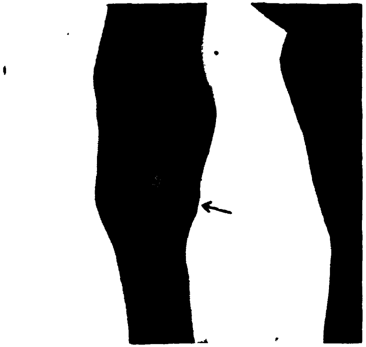
The hoof wall is attached to the foot bone by means of the numerous laminæ (plates) on the outside of the sensitive wall, which fit into the laminæ on the inner surface of the horn. The sensitive laminæ are very vascular and easily become diseased if injured. The horny wall derives its nourishment also from the sensitive wall.

The growth and quality of the hoof are improved by applying stimulants to the coronet. The "white line" that can be seen between the sole and the wall on the ground surface of a freshly-trimmed foot, is a band secreted by the sensitive laminæ, connecting sole and wall.

Sole.—This is similar to the wall, is concave on its under surface, and is bounded by the bars and the wall. It takes six months to grow down from the sensitive sole, which is attached to the ground surface of the foot bone, and which supplies its nourishment. It should be firm, not spongy. The sole must never be cut away. The sole is thicker at the perimeter. A good sole should be well arched.

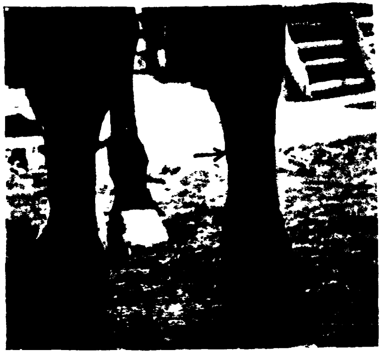
Bars.—These divide the sole from the frog. Between them and the frog is a groove or commissure, which allows the frog to expand when pressed on the ground. The bars grow down from the sensitive sole, which nourishes them. They must not be cut away; if this is done, contracted heels and diseased frogs ensue. They support the wall at the heels and allow for expansion of the heels, as the frog expands on pressure.

Frog.—A wedge-shaped portion of elastic horn situated between the bars. It grows downwards from the sensitive frog, which provides its nourishment. It takes two months to grow. On its under-surface, along the median line, is the cleft, which should be shallow and rounded; at its base are two bulbs (the bulbs of the heel).



SPAVIN

CLEAN INSIDE HOCK



SPLINT

CLEAN LEG

CURB

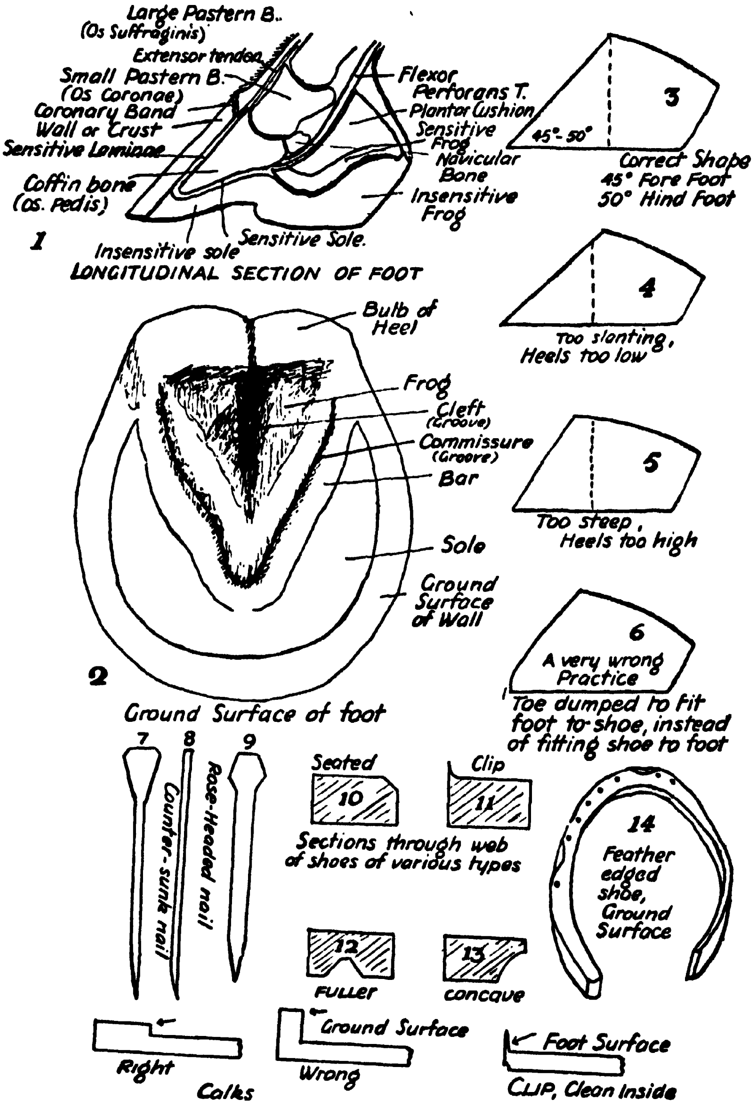
CLEAN BACK OF HOCK

Photo: G.P.U.

POLO PONIES

Photo: Haas, New York

POLO PONY: C. COLUMBUS



FOOT OF THE HORSE AND ITS SHOE.

The frog is much softer than the sole or wall. (Plate facing p. 193.) Its function is to bear weight, prevent concussion and slipping, and to expand the heel every time it comes to the ground by bulging outwards. Hence the importance of having frog pressure always, and never cutting the frog away. High calkins on hard streets are very injurious.

Above the sensitive frog is the plantar cushion or frog-pad, which lies between the two wings of the foot bone. The frog-pad also lies between the two lateral cartilages. This pad acts as an extra cushion for absorbing shock, and expanding the heel.

Lateral Cartilages.—These are situated on each side of the foot, just inside the top of the wall and outside the plantar cushion. They join the heel of the wall to the wing of the foot bone on each side. They are made of flexible cartilage, which permits the movement of the heels of the wall, and they become easily diseased if injured, forming quittor and sidebone. (Plate facing p. 193.) They assist in supporting the heels. The two lateral cartilages are joined together by ligaments which pass through the frog-pad; they also give some attachment to the sensitive laminæ.

Growth of the Horn.—The growth of the horny parts is regular all over if the action and distribution of weight are normal and even. The rate of growth varies in different feet. Growth is faster in warm, dry climates and in healthy, energetic animals. The hoof grows faster in summer, when it is also harder. On soft ground it will be larger, softer, and flatter; and on hard ground, smaller and harder, with a small frog. The average rate of growth of the wall is a quarter of an inch a month.

The growth is less where the weight, and the consequent wear, are the greatest; hence the importance of even distribution of weight.

Mechanism of the Foot.—Normally, the heel touches the ground first at each step. The concussion is overcome partly by the elasticity of the fetlock joint, and the limb above; partly by the descent of the pedal bone, and flattening of the sole arch, and by the compression and lateral expansion of the frog and plantar cushion. The expansion of these widens the heels of the hoof, and causes a mechanical movement of the lateral cartilages. In this action, the lateral cartilages act as "valves" for the venous circulation of the foot. There are no true valves in the veins in the frog. This is why this circulation is impaired, and the cartilages become diseased or ossified into sidebones, if the frog pressure is not permitted.

The frog is also the chief non-slipping grip the horse has upon slippery ground. The outrageous practice of paring away a frog must never be allowed.

The expansion of the heel of a healthy foot is well demonstrated by the bright, smooth patch on the upper surface of an old shoe at the heel.

Principles of Shoeing.—The outside of the wall, which is the periople, must not be rasped, as this cover is necessary to keep the horn from becoming brittle.

Still more important is it that none of the toe of the wall should be pared off or "dumped." This iniquitous practice, to save fitting the shoe properly to the foot, reduces the width of the weight-bearing wall, and lessens the nail-hold. It also exposes the ends of the horn fibres and allows the drying out of the horn.

The sole, as it grows down, dries out underneath, and from time to time a flake of horn (false sole) can be lifted off with the hoof pick. This may come off while at work. But the sole must never be pared away by the farrier.

The frog must not be cut, except for the trimming off of any jagged pieces; nor, on any account, must the bars be cut away.

As the hoof-wall grows about a quarter of an inch in a month, and it is the general practice to re-shoe once a month, it is necessary to remove with the farrier's knife about this amount from the ground surface of the wall.

The slope of the toe of the wall varies with the conformation of the foot; it averages 45° to 50° on a fore-foot, and 50° to 55° on a hind-foot. (Illustration, p. 225.)

Feet of bad shape can be gradually improved, but it takes several months to accomplish; many feet cannot be made normal in shape. A very long toe can never be made to assume the correct angle, nor can a very upright foot. It is wrong to attempt such a thing.

The slope of the foot, then, can be altered considerably by the amount the toe or heel is rasped or pared on the ground surface. The farrier judges the correct amount to remove at each dressing of the foot in order to get as near to the correct slope as possible.

The pressure on the frog can also be greatly affected by the height of the heels. If the heels are too long, frog pressure will be reduced or removed entirely; if the heels are taken down too much, the strain on the back tendons of the leg will be too great: that is, the toe will be too long. Long heels also increase concussion. Great experience and knowledge are therefore essential to be a successful shoeing-smith.

The foot should not be rasped down to expose the "white line" all the way round.

The practice of "opening the heels" by paring away the wall excessively at the heels and part of the sides of the frog, must never be permitted.

Small feet do not stand hard work, especially with farm horses. But if too large, they are liable to be of coarse texture, and deficient in toughness and strength. Healthy feet are generally in pairs. Odd feet generally point to the existence of disease.

On hard ground, in order to get frog pressure, the shoe should be as thin as is practicable. Frog pressure hastens the growth of the frog, but its wear does not allow it to grow much lower.

On slippery roads the horse must have frog pressure to allow him to "feel" the surface; the plantar cushion is well supplied with sensory nerve endings. A good frog also acts as a kind of sucker on a smooth road.

Preparation of the Foot.—In preparing the feet, both feet of the same pair must be of the same length and slope, as far as it is possible. But odd-shaped feet do exist.

When the foot is placed on a plane, every part of the ground surface of the wall must bear on the plane. It is impossible to lay down the exact shape of the foot. After paring and rasping smooth the ground surface of the wall as explained in the foregoing section, the rasp is run around the outer edge to bevel it and prevent the horn from splitting afterwards.

Fitting the Shoe.—Horses must be re-shod, or have the shoes removed and the feet trimmed, once a month. Feet will not generally stand being re-shod more often than once in three weeks, chiefly on account of the fresh nail holes being too near to the old ones; therefore, it is necessary to make the shoe of material strong enough and thick enough to last the prescribed period. The wear on the shoe will depend on the work done by the horse, and the type of road or ground he works on.

In shoeing the horse, he must always be well-treated, and made to associate the operation with pleasant things. A little patience will save no end of trouble; whilst hasty action will spoil the horse. If a horse is frightened by being abused in the forge he can cause much trouble to the farrier.

The upper surface, or foot surface, of the shoe must be a true plane and not seated out; it must be in contact with the wall at all places. Never "ease the foot" by not having the heel of the wall resting on the shoe; it will cause the structure of the wall to break down.

The shoe must be bent on the anvil so that the outer circumference absolutely corresponds with the outside of the hoof. The shoe must fit the foot.

Shoes should be of the best mild steel. Racing-plates are necessarily made of better metal. The shoe must be no heavier or thicker than is necessary to last until the next shoeing.

The width of the web is approximately ¾ in., except on very heavy horses.

The thickness of the shoe is not so important on farm horses working much on the land, because they get plenty of frog pressure.

The practice of shoeing with weighted shoes, or extra heavy ones, as is done in producing the exaggerated action of show Hackneys, is unnatural and often cruel. But weighting has often to be done to correct uneven action.

Shoes vary in weight: for hunters and light harness-horses, from 8 oz. to 15 oz.; for heavier carriage-horses up to 24 oz. each; and with heavy draught horses some shoes weigh 5 lb.; but there is no sound reason for using such heavy shoes.

The ground surface of the shoe is either flat or it is fullered. The fuller (groove) runs around closer to the outer edge, and affords a better grip on the ground. The heads of the nails should rest right in the fuller. Hunters and saddle-horses are commonly shod with fullered shoes. And with these horses it is common to have the inner edge of the shoe "concave" or bevelled; this lessens the suction produced in going over muddy country. (Plate facing p. 193.)

The length of the shoe heel is important. Hind-shoes can have slightly longer heels without danger; but in fore-shoes, long heels may get torn off by the hind toes. On the other hand, if the heels are too short, corns may be caused by the pressure of the end of the shoe.

The heels of the shoe are not cut off until it has been accurately fitted all round to the foot. After the foot has been prepared (*see* page 227), and the type of shoe chosen and made to fit the foot accurately by means of the fire and anvil, it is heated to a black heat only, and placed in position on the foot for about three seconds, until a cloud of smoke comes up from the burning horn. This seals up the ends of the horn fibres, and protects the foot; but prolonged burning, sometimes carried out by farriers to save paring the foot properly, will do serious harm to the foot. This slight burning will also show any portion of the surface that is not quite level. The rasp will be used to rectify this. A red-hot shoe must never be held against the foot.

Most shoes to-day are machine made; but every farrier should be proficient at hand-making any ordinary shoe from bar steel, as well as special ones.

Nails.—Only sufficient nails should be used to hold the shoe on securely. The number will depend on the size of shoe, the condition of the foot and the work. The better the foot has been taken care of and dressed, and the better the fit of the shoe, the fewer the nails that will be required.

Nails should be used no larger than is absolutely necessary for the purpose.

Nails are not generally used at the toes, or near the heels, so as to allow full expansion of these parts.

Five nails (two inside and three outside), or six at the most, should be sufficient for fore-shoes; and six for hind-shoes. For heavy draught horses, seven and eight are necessary.

It is vitally important that only nails of the best steel should be used. Horse-shoe nails of unreliable manufacture are a grave danger; they may split on being driven in, and a part run into the sensitive foot. As one part may come out at the correct place, the injury may not be discovered at the time, and serious consequences may follow. The point of every nail should be carefully examined before it is driven in.

The nails must fit the shoe accurately. The hole must not be larger than the nail. They should be fitted before the shoe is tacked on. Tight clenching to compensate for loose nail-holes must never be allowed.

The nail-holes must be close to the outside of the web.

Before punching the nail-holes in the shoe it is most important to see if there is any portion of the hoof that is not fit to receive a nail.

Nailing on the Shoe.—On one side of the point of a horse-shoe nail there is a small bevel. The nail is driven into the wall, with the bevelled side towards the centre of the foot; this directs the point of the nail outwards and causes it to come through the hoof at the desired place. If the nail were turned round it would drive right into the sensitive foot and cause a "prick."

The first nail should be driven in towards the heel, that is, at an angle to the surface of the shoe. This will tighten the clip of the shoe, if there is one; and, in any case, cause a firmer shoe than if all the nails were driven in at right angles to the direction of the web of the shoe. It is usual to drive the centre nails on each side first; these are held at about right angles to the foot, so that the points will come out about an inch up.

The toe nails are held with the heads a little away, and the heel nails with the heads towards the centre of the foot.

All the points should come through on an approximate level, an inch up the hoof.

An experienced farrier will tell by the sound that the nail is driving in correctly. If there is any doubt, or the horse gives the slightest flinch, the nail must be carefully withdrawn and the tip examined for blood. It may have only pressed on the sensitive laminæ without pricking—this is known as a "bind."

Fine-nailing is when the nail-holes are near to the outside of the shoe; coarse-nailing when they are farther in.

Each nail must be driven in right home; the point that protrudes is twisted off with the claw of the hammer. Sufficient of the nail is left to form the clench. After all the nails are put in, they should again be hammered to make certain that all are in correctly; while doing this the head of the pincers is held against the clench to flatten it out. The practice of rasping a groove in the wall under each clench is not advisable, because the clench should bear on the hardest part of the wall, which is the outside. The clench is then hammered down gently to rivet it over. If it is then too big or jagged, it can be filed down a little.

The clench must be large enough to hold the nail in; but if too large it will tear the hoof, should the shoe become torn off. In filing the clenches, the periople must not be filed.

The nails must not be clenched too tightly. This will damage the foot and cause soreness or permanent injury.

Clips. (*See* page 225.)—In hunters one clip is usually made on the toe of the shoe. In harness-horses, there are usually two, one on each side of the toe. The clip holds the shoe very much more securely on the foot. In making the clip great care must be taken that it is quite thin, and that the inside is not bulged out; it should be nearly flat. A bulge will press into the toe of the hoof and is a common cause of seedy toe. *The clip must be bent to the slope of the foot before the shoe is nailed on, as it must never be knocked into the wall after the shoe is on. This would bruise the wall.* In preparing the foot, only *sufficient horn must be cut* out to fit the clip; the groove made should therefore be quite small. *Clips should only be used when they are absolutely necessary.*

Calkins, or calks, are projections on the under-surface of the heels of the shoe, made by turning the heel over.

It is more general to use these on hind-shoes only; in which case the horse should be shod with slightly longer shoes, as the calks will then tip the feet up less.

On hunters and jumpers calks are generally used behind. On draught horses they are often very useful. On heavy draught horses that work on city pavement, calks are commonly used on all four shoes. Nevertheless they cause much trouble to the feet, through preventing frog pressure on city streets.

Calks must never be high, but long and low. (Illustration, p. 225.)

Removing Shoes.—The heads of each nail must be hammered home and then each clench cut off with the buffer. The shoe is then drawn out a little with the pincers, and again tapped on; this exposes the nail-heads, which should be pulled out with the pincers. The shoe must never be wrenched off with the nails in the foot, as it may tear away some of the hoof. Care should be taken to remove all old clenches.

Special Shoeing.—*Tips.* These cover the toe of the foot, and extend only from quarter to quarter. They are made quite light. The rear ends are either tapered, or cut square, and let into the hoof. The latter are the stronger. Two nails on each side are sufficient.

They are used to give extra frog pressure, and to cure diseased or contracted frogs. Care must be taken that the heels and frogs do not wear down too much, and that the horse is not at first, in any case, taken over stony ground.

In Alberta, on the dirt trails and on the ranches, saddle-horses are often left unshod.

Bar shoes have the heels connected under the frog, and are useful in relieving pressure on part of the wall, as when corns or soreness are present.

Three-quarter-bar and half-bar shoes are commonly used for corns. A bar shoe should not be used if the frog is very hard, or it will tend to cause lameness. The frog should be *softened first* with a linseed poultice.

For contracted heels a bar shoe will spread the heels, if the heels of the wall are lowered so as to be clear of the shoe, and give good frog pressure.

Half-bar shoes are used for quarter-crack.

Rocking shoes are made with thick quarters and thin toes and heels; with a level foot, or solar, surface. They are used in cases of laminitis, and of dropped sole.

For interfering, *side-weights* are used on the outer side of the striking foot. In weighting the sides or toes of shoes, the weight must be on the web and not protruding over the hoof, as is common with trotting horses.

Feathering. A feather-edged, or knocked-up shoe is one in which the web on one side is less than half the normal width and in which there may be no nails. The inner side is feathered to prevent brushing or cutting. Hind-shoes are more often treated in this manner. (Illustration, p. 225.)

Non-slipping Shoes.—With modern roads, constructed solely for the benefit of motor traffic, the shoeing of horses has become a difficult problem, particularly when the horse is ridden or driven badly.

Many patent shoes are now on the market. The "Clutch-in" shoe is one. Rubber pads are used considerably by mounted city police.

In most cases good frog pressure and flat shoes would be almost as safe.

Recent tests made by the Institute of the Horse resulted in Gray's flexible bridge pads and the Brierly non-slip shoe being found highly satisfactory on slippery roads.

Pavements.—Horses should be trotted on the soft sides of the road whenever possible. With harness-horses this is seldom feasible. It is always better to avoid a hard-paved or macadam road, even if it involves going a little greater distance.

Horses should never be galloped or trotted more than about nine miles per hour on hard roads.

Wood-block pavement is the easiest on the legs, but when wet, it is slippery. Limmer asphalt is less slippery, but harder, except in summer, when it is softened and offers fair footing.

Now that roads have a smooth surface, there is no necessity for so great a camber. If the camber were reduced so that the road were nearly level, horses would be very much less liable to slip.

Much research work is necessary to discover a road material that is suitable alike for motor and horse traffic. Rubber blocks appear to be satisfactory.

Slippery streets in cities and towns should be freely sprinkled with sand to save side-slips of motors, and horses from falling.

Steep hills should never be smooth-paved; but always with cobbles, bricks on end, or rough macadam.

Some tarred roads are disgraceful.

The practice of allowing engine-oil to drip from motors on to the road should be prohibited. It is a very dangerous one.

Winter Shoes.—In Europe it is common to use shoes in winter with threaded or machine-turned holes in the web, two at the toe, and one at each heel. In the former, screw-calks, and, in the latter, drive-calks, are fitted in the event of frost.

The calks should have a hard steel centre and be soft outside, which allows them to keep sharp.

In Scotland and Canada, the Scottish type of drive-calk is commonly used, with a round or square shank. The former are best. The Giant-Grip, Green-Bay, and Neverslip are makes of the round shank drive-calk and shoe. The calks vary in length and are blunt (for the inner heel), or wedge-shape. There are several sizes to fit different-sized shoes. The advantage of removable calks is that they can be replaced when they become blunt, and can be taken off at night with a specially provided tool. If they are removed continuously, however, they are more liable to work loose, and then to drop out on the road.

Where the snow is fairly deep, these long-calk shoes are dangerous; the fixed-calk winter-shoe, with a broad wedge on the toe, a blunt calk made on the inner heel, and a sharp calk (longitudinal) on the outer heel, is the best form to use. The calks will remain quite sharp enough for a month. With saddle-horses and most harness-horses, where the snow is quite deep and the footing is good, the toe wedge can be dispensed with; the heel-calks must be kept low.

Common Faults of Farriers.—Amongst civilian farriers it is quite common to see the following faults: rasping the outside of the wall; rasping a notch for the clench; rasping the clench too much; clenches too high or too low on hoof, or not in an approximate line; clenches too near old nail-holes; dumping the wall of the hoof; paring the frog, bars and sole; lowering the wall too much, not enough, or unevenly; uneven bearing of shoe on foot; "opening the heels"; using too many nails; nails too large; nail-holes in shoe too large; clenching too tightly; excessive burning with hot shoe. None of these practices must be permitted, in order that the horse's feet may be as healthy and sound as possible.

Unshod Feet..—These require careful attention and must be trimmed at least once a month, even if the horse is given regular work that keeps the length of the feet normal. The edges will nearly always require to be rasped round, to prevent breaking.

Care of Foal's Feet.—Attention must be paid at least once a week to the feet of a young horse. This also accustoms the horse to having his legs handled. The young foal may so wear down his toes on sandy ground as to allow grit to get in at the "white line," and cause lameness. Shoeing with tips will prevent this. The hoofs of most young horses generally require trimming periodically. It is important to prevent them getting out of shape, which may happen if they are not attended to.

Pricks.—These are caused by a shoe-nail, or other nail or sharp instrument, running into the sensitive laminæ, sensitive sole or frog. If caused in the forge, it is due to the nail being driven too coarsely or to the nail breaking (being of inferior quality). The thickness of the wall must be understood by the farrier. Pricking may ruin a horse. While riding or driving, a look-out should always be kept for nails and pieces of wood that may have nails in them. The shoe must be removed. The seat of injury should be opened up by the farrier, and a very strong solution (25%) of carbolic acid forced in with a hypodermic syringe, right to the bottom of the hole. Antiseptic dressings should then be applied. If the nail has been in for some time, or is rusty, the foot should be soaked in a hot antiseptic bath for half an hour before injecting, and anti-tetanus serum should be given. The antiseptic bath is better than an antiseptic poultice. Ordinary poultices must never be used, as they assist in the breeding of germs. A saturated solution of picric acid injected into the hole has produced good results.

Presses or Binds.—These are caused by a shoe-nail being driven too coarsely and bulging the horn into the sensitive laminæ without pricking it. The result is a bruise. If the nail is withdrawn and there is no blood on the point, it generally indicates that it has not caused a prick. With the removal of the cause, the foot should recover. It is safer to inject the carbolic into the hole.

Forge Tools.—The anvil is the most important tool in fitting or making shoes. It must be a heavy one: 150 lb. for the shop; 100 lb. for the field. Fire-tongs, used for holding the shoe in the fire, have long handles. Shoe-tongs, used to hold the shoe while working on the anvil. Turning-hammer, 4 lb., with one flat and one convex face, used on the anvil.

Sledge-hammer, 9 lb., is used by the assistant (striker) to weld, cut or mould, in making shoes from bar steel.

Concave tool (swedge) and other shaping tools, held by the farrier while the striker uses the sledge on the tool.

Fuller, a blunt chisel in wooden handle, used to mould the fuller in ground surface of shoe.

Pritchel (counter-sinker), used to punch the holes in the shoe for the nail-heads to fit in.

Stamp, used to make the nail-holes in the shoe. This and the foregoing tool must be of the same size as that of the nail used.

Shoeing Tools.—The shoeing-hammer has a small head and curved claws, used for driving in and clenching the nails. Buffer: 5½ in. long, has chisel at one end to cut off the clenches, and a point at the other to punch out broken nails from the foot. Pincers: used for drawing nails and for clenching. Drawing-knife: has curved blade, used to pare down wall, and remove ragged pieces of horn. Must be kept sharp. Rasp: has one half of one side file-cut, remainder coarse-cut for taking down ground surface of wall; 16 in. long. Searching-knife: for examining ground surface of foot, and hoof trimmer.

FAULTY FEET

Flat Feet.—Flat feet are large, with sloping walls in front, low heels, and flat and thin soles. Narrow feet are the opposite: small, with upright walls and high heels. Flat feet have large frogs, and are generally preferable to narrow feet that have narrow frogs. The majority of faulty feet have been made so by abuse in shoeing.

Forging or Clicking.—*Cause:* Striking the back edge of toe of the fore-shoe with hind-shoe while trotting. Due to improper shoeing or uncollected gait.

Treatment: Ride or drive horse collectedly. Use concave shoes in front. Increase the action of the fore-feet by heavier toes on shoes, and delay action of hind-feet by leaving toes longer. Get hind-toes as long as fore. The hind-foot is usually shorter, which causes the horse to bring the feet up quicker.

Stumbling.—*Cause:* Carelessness; lameness; toes too long; wrong shoeing.

Treatment: Roll the toes of fore-shoes. Set shoes back a little. Ride and drive horse carefully.

Contracted Heels.—*Cause:* Cutting away the frog, high calkins, or any interference with frog pressure.

Symptoms: Narrow, shrunken frog; heels close together.

Treatment: Remove the cause. If thrush (*see* page 239) is present, treat it. Obtain frog pressure; shoe with tips.

Corns.—A corn in a horse's foot is a small bruise in the sensitive sole due to a blow or severe pressure. It in no way resembles a corn on the human toe, which is a hard epithelial growth, caused by intermittent pressure. Weak heels and flat soles are more subject to corns. *Cause:* Bad shoeing, heels of shoe too short, severe work on hard or stony roads; stone wedged above heel of shoe; paring away too much of heels. Common in flat-footed heavy horses and box-footed light horses.

Symptoms: Horse is generally lame. Lameness will increase if horse is worked. May point affected foot when standing. Usually in fore-feet. Commonest seat is internal part of sole near heel, in between wall and bar, where there is most weight. Tapping or pinching over seat of corn will produce pain. Horse may go in a shuffle, or stumbling gait. Stepping on a stone will cause great lameness for a few steps.

Treatment: Remove the shoe. When the stain appears dark, the corn is an old one, and is easily cured by paring away over the seat. If it is bright red it is new, and requires more careful attention. Further injury would cause suppuration, acute lameness and, possibly, a bad abscess or even quittor. Make small hole and let the fluid out. Plug with tow and Stockholm tar. If there is suppuration the wound must be treated aseptically.

If there is no suppuration, shoe with three-quarter-bar shoe, keeping seat of corn free from pressure. If the corn is on both sides, shoe with tip and extend a bar from this across the frog. Do not pare sole. If foot is shod over the seat remove sufficient horn to keep pressure off injury.

Sandcrack is a fissure in the wall running in direction of the horn fibres. *Cause:* Weakness. Constitutional disturbance. Common in flat feet. Brittle feet; rasping the walls.

Symptoms: There may be lameness. A groove or fissure on wall running downwards and forwards; may only extend down part of foot.

Treatment: If lame, use antiseptic poultice. If fissure does not reach coronet, rasp a nick across the top, remove shoe, cut notch in bottom of wall under fissure. Replace shoe. If fissure reaches coronet, burn inverted V into horn, large enough to enclose fissure; with apex of V just touching coronet. Use local anæsthetic. If fissure extends full length of foot, use special clips to hold hoof together.

For a quarter-crack use a half-bar shoe, and be sure that all pressure is removed under seat of injury by notching the ground surface of wall.

If the coronet is affected, the horse must not be worked until the hoof has grown down at least half an inch. A notch must be made to prevent the fissure extending upwards, or clips can be used as well.

Split Hoof.—May be due to concussion or other external injury. As a rule the split commences at the bottom. It may be horizontal. Treat as for Sandcrack.

False Quarter.—A depression in the direction of the fibres of the wall on the outside, from the coronet. Due to injury to the coronet, as a tread.

Treatment: Blister coronet. Give light work, and take precautions as for Sandcrack, to prevent hoof splitting.

Seedy Toe.—Similar to false quarter, except that the depression is inside the horny wall. The cavity is filled with a soft, crumbly material.

Cause: Injury to coronet, laminitis, continued strain, prolonged standing on feet. Prolonged application of hot shoe. Pressure of clip or hammering clip into wall.

Symptoms: The depression will be visible when re-shoeing. Lameness. Hollow sound on tapping outside of hoof.

Treatment: Remove cause and take all weight off foot under the injured part. Paring out of part under veterinary supervision is often advisable. Blister coronet over injury.

Brittle Feet.—Often constitutional. *Cause:* Working and standing on hard, dry ground. Injurious hoof dressings.

Treatment: Obtain good frog pressure. Pack feet with hoof-tone, or other suitable clay, for 24 hours. Stand in mud puddle. Or apply occasionally:

Oil of Turpentine . .	1 oz., or	30 c.c.
Oil of Tar . . .	1 oz., or	30 c.c.
Fish oil. . . .	4 oz., or	120 c.c.

Shake well. Line stall with blue clay. Soak feet for few hours in water bath, and oil afterwards to keep moisture in.

Tread.—A wound on the coronet or near to it.

Treatment: Syringe out wound and treat aseptically. Apply tinc. iodine, or tannic acid. A mild blister may be necessary.

Thrush.—Frog and heels not functioning properly, and consequent drying up of frog. *Cause:* Neglect in daily cleaning of frog. Bad shoeing, cutting frog and bars away. Standing in dirty stables. Tan-bark left in hoof.

Symptoms: Bad smell from cleft or grooves of frog; secretion of a greenish fluid, which originates from the plantar cushion. The odour of thrush cannot be mistaken.

Treatment: Remove with paring knife all rotten horn. Syringe out with strong antiseptic. Apply calomel (mercury subchloride). Then plug with tow and Stockholm tar. Remove the cause and obtain frog pressure.

Acute Laminitis, or Founder.—Inflammation of the sensitive laminæ of the wall. Defective feet and heredity predispose horses to this. Generally develops in fore-feet. Common in flat feet. *Cause:* Concussion. Prolonged exposure to hot roads at slow pace. Overfeeding grain with insufficient exercise. Bad shoeing and preparation of foot. Watering when very hot and left standing after. Loose horse gorging itself at oat bin. May follow diseases of lungs or genital organs.

Symptoms: Sudden immobility of fore-limbs. Much heat in feet. Horse tries to move on heels. Temperature and pulse up. Increased respiration, similar to congestion of lungs. Unwillingness to move.

Treatment: Remove shoes and lower heels to get weight on frog and off the walls.

Give pint of linseed oil and enemata. Put in comfortable loose-box. Feed on green food and laxative diet; no grain. Stand in cold-water bath. Do not poultice. Shoe with rubber pads for a while afterwards.

After long standing on board ship a long walk may bring on laminitis; prevent this by placing in loose-box for a few days.

Chronic Laminitis.—*Cause:* Repeated attacks of founder. The union of the wall and laminæ becomes affected.

Symptoms: Lameness; horse bears weight on heels. Short gait. Concave slope to wall. Sole flat. Horn brittle and weak. Work increases lameness. Formation of rings around outside of wall.

Treatment: Obtain frog pressure. Lower wall at heels. Shoe with rubber pads. Laxative food. Light work on soft ground. If feet hot, stand in cold foot-bath for a couple of hours.

Photo: W. A. Rouch

THE KING OF SPAIN ON A POLO PONY

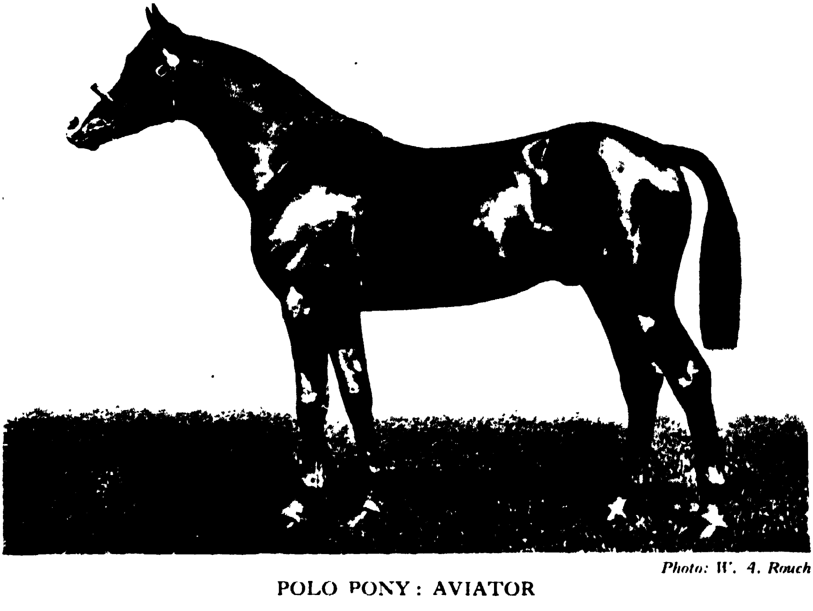


Photo: W. A. Rouch

POLO PONY: AVIATOR

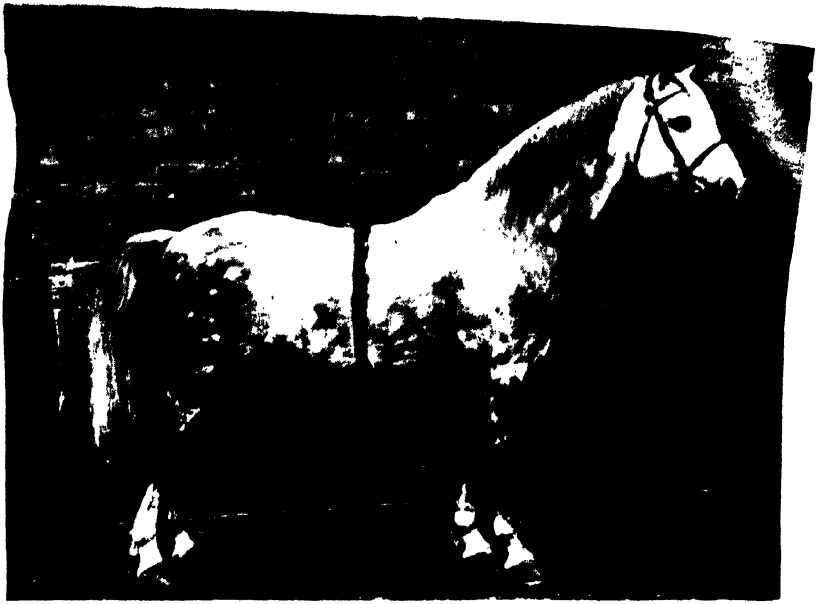


Photo: Sport and Ge

WELSH PONY : GROVE KING COLE II

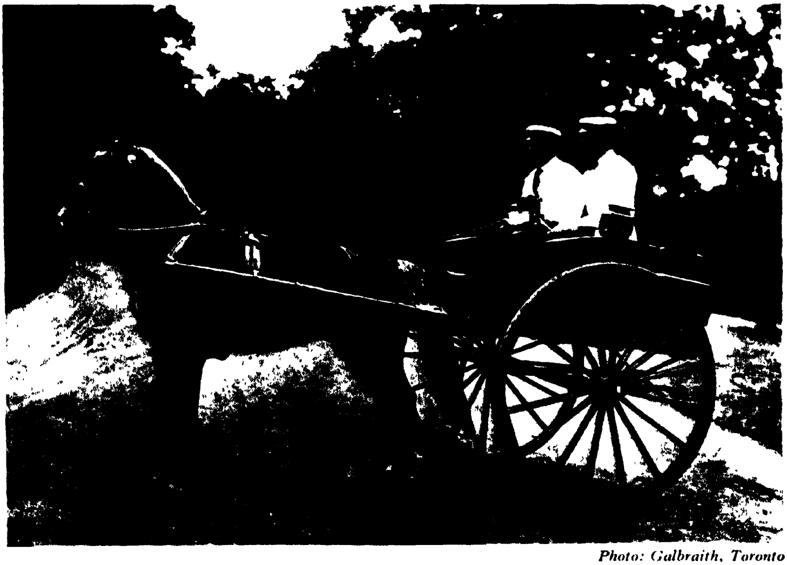


Photo: Galbraith, Toronto

HACKNEY PONY

CHAPTER X

LAMENESS AND INJURIES; ANTISEPTICS; ANÆSTHETICS: DESTRUCTION

LAMENESS.—This is the commonest ailment of the horse; most of it is due to carelessness or wrong handling. It is the outward sign of inward pain.

Improper shoeing upsets the horse's balance and causes much lameness.

A horse is lame when pain or inability (stiffness) causes him, during movement, to diverge from permitting the normal distribution of weight upon his limbs.

Irregularity of gait is not necessarily lameness. For instance, "bridle lameness" refers to a horse that extends one fore-leg farther than the other while trotting, generally due to bad training. On the other hand, a horse that is lame in both fore-feet may go apparently soundly. Lameness generally produces decreased action in the affected limb. Stringhalt, due to an involuntary nervous contraction of the peroneus muscle above the hock, is not strictly a lameness.

Much lameness in the domesticated horse is due to the long periods he stands on a hard stable floor, shut off from sunlight and fresh air.

More than 80 per cent. of lameness is below the knee or hock.

Most lameness is due to pain, the result of a sprain or bony growth.

A *sprain* is an injury to a muscle, ligament or tendon, caused by excessive work enforced by tension or torsion, or the prolonged application of repeated work. The fibres of the organ are stretched or broken, or their attachment to another organ may be severed.

A *strain* is a temporary, mild injury, that rapidly readjusts itself on the cause being removed.

Almost all sprains can be cured if treated in time. Permanent injury is nearly always the result of trying to keep a lame horse "on his legs."

Detection of Lameness.—The normal action of the horse must be thoroughly understood. The flexion of the hocks and knees is most important. The action of the limbs must be on a vertical plane, without throwing the foot out or in. Length of stride is necessary, and is due to good conformation, breeding and training. The feet must be brought up with a snap, carried well forward and placed on the ground with decision.

A horse that stands with his toes out will usually swing his toes in; and one that stands with his toes in (pigeon-toed) will usually swing them out (paddling).

The horse's attitude in the stable must be noted. A sound horse stands equally on his fore-feet, and rests the hind ones alternately. It is essential to detect lameness in a horse before getting far from home. If there is any suspicion, he should be tried out on hard ground that is level and free from stones. A dishonest dealer will trot his horse on soft ground.

The trot is the pace at which to detect lameness. The condition is revealed by more weight being thrown on the sound limb or limbs than on the injured one. The head is also used to decrease the weight on the injured limb.

If the horse is lame in front he will raise his head when the injured leg is on the ground, and lower it when the sound one is on the ground.

If he is lame behind he will drop his croup as the sound hind-leg is on the ground, and lower his head as the injured hind-leg and the diagonally opposite fore-leg are on the ground.

Level, hard ground, that is free from stones, should be chosen for trying a horse. The examiner should be thirty yards off, and have the horse trotted up freely past him, with his head quite loose, with at least two feet of rope. If the head is held tightly he will not be able to nod it if lame. It must be noted if he dwells more on one leg than another, and if the movement of his head is normal and even. At the end of each run the horse must be turned about, alternating the rein on which he is turned, to ascertain if he turns equally on either leg. The action as viewed from both sides should appear the same.

Lameness caused by splints, sore shins, corns, laminitis and sprains increases in intensity with exercise; most other lameness decreases with exercise.

Having discovered the lame leg, it is then necessary to discover the affected part. Disease and injury usually show themselves by heat or swelling.

The affected leg must be compared by touch and observation with the sound one. The back of the hand is more sensitive to detect heat. If one foot is hotter than the remainder, the lameness is very likely there.

Lameness may be detected without leaving the stable; for example, severe pointing of one fore-leg is a sure indication. Moving over in the stall may expose the seat of the injury.

Hock lameness is usually detected by turning the horse on a small circle; but it is difficult to detect when the horse is moving straight.

The hypodermic injection of cocaine, etc., is most valuable in diagnosing the seat of lameness. The exact place can easily be detected in this way.

To diagnose between foot and shoulder lameness, lunge on small circle; if lame in the shoulder, the horse will be more lame when the bad shoulder is outside; and if in the foot, more lame when the bad foot is inside.

Any uneven wear on the shoe should be noted. Special shoes denote uneven action somewhere; e.g. feather-edged shoes for brushing, bar shoe for sidebone, corn, etc.; high-heeled shoes for tendon sprains. High heels and paring of frog in navicular disease.

If the foot is suspected, the shoe must be removed and every nail carefully examined for a "prick." (*See* page 235.) In navicular disease the horse puts his weight on the toe; in laminitis, on the heel. The foot must be tapped all over and "searched" underneath with the searching knife. The lateral cartilages should be examined; they should be springy. (Plate facing p. 193.) The pasterns should be examined for ringbone. Over-reach, treads, cuts and brushing must be looked for; and bruising of the sole or frog.

The two back-tendons, and suspensory ligament (especially just above the fetlock), the fetlock and front-tendon, must be examined for heat, puffiness, soreness and swelling. If the back-tendons or suspensory ligament are affected, the horse will put weight on the toe.

The cannons must be examined for splints. The hock for curb, spavin or bog spavin. (Plate facing p. 224.)

A slip may sprain the internal lateral ligament of the elbow, in which case the horse will turn the point of the elbow outwards to relieve that joint of weight. When passaging towards that limb, he will drag it.

In shoulder lameness, pressure on the affected muscle will evince pain. The horse will drag the limb when moving in the direction towards which the affected muscle lies. If a tin of oats is shaken behind him in the stall he will hesitate to look round towards the lame shoulder.

If the stifle (patella) is out, the leg will be dragged in going forward. The bone can be felt out of place.

If he is lame in the hip-joint (coxo-femoral) muscles, he will turn his toe in if the muscles above the joint are affected, and out if those below.

If the muscles in front of the thigh are affected, he will drag his leg when going forward; if those behind (region of buttocks), he will drag the leg in backing. If the inside or outside muscles of the thigh are affected, he will show it when moving over in the stall.

Anatomical Terms.—The upper surface is called, proximal, superior or dorsal. The under surface: distal, inferior or ventral. The front surface: anterior. The back surface: posterior. The internal surface is that nearest the median line, which is an imaginary line through the centre of the horse from head to tail. The external surface, is that farthest from median line.

BRIEF HISTOLOGY OF THE TISSUES

The Muscles that move the limbs are voluntary and consist of bundles of fibres. The end that has the least motion is called the origin; the other end, the insertion. They are attached to bones, tendons and ligaments.

Ligaments are white—inelastic; and yellow—elastic. The white ligaments secure the bones together at joints; these are the ones that are commonly injured.

The chief yellow ligament is the *ligamentum nuchæ* which supports the weight of the head; it is attached to the poll and the withers.

The shoulder joint, unlike other joints, has no white binding ligaments. There are also annular ligaments (white) that keep the tendons in place; and capsular ligaments round a joint that keep the synovia in place.

Tendons are strong, white, inelastic cords that join muscles to bones, and act like signal wires.

Bone.—Healthy bone is bluish-pink, hard and insensitive. Diseased bone is very sensitive. Dead bone is yellowish-white.

Bone is composed of elastic animal matter and brittle mineral matter. The proportion of the mineral is very small in the young bone, and high in the old. In the embryo, bone is all animal matter. Unlike the human child, the foal at birth has a fair proportion of mineral matter, so that it can stand on its legs within an hour of birth.

A one-year-old foal has 55 per cent. animal and 45 per cent. mineral. At six, it has 33 per cent. animal, and 66 per cent. mineral.

Bone consists of a hard outer layer and softer honey-combed inner cancellated tissue. This inner tissue gives strength to the bone without increasing the weight; the bone marrow lies in this tissue, which also contains bone-producing cells, blood-vessels, etc.

Bones are surrounded by a thin vascular skin (the periosteum), except over articular parts. The periosteum is easily injured, which may result in the bone becoming diseased if great care is not taken. It contains arteries and veins, and nourishes and protects the bone.

SPRAINS

The commonest sprains occur in the back-tendons of the legs; the suspensory and hock ligaments; and the shoulder muscles.

Ligaments and tendons may be stretched with some of the fibres lacerated, or they may break through, or be torn from their attachment.

When a tissue becomes sprained, the blood-vessels become gorged with blood and the circulation becomes more or less stagnant. There is also an escape of fluid from the ruptured vessels which makes the part tense, hot and painful, and which also interferes with movement of the part.

It is essential, then, to check this accumulation of fluid and hasten its removal. Pressure, evenly distributed, and massage are the best remedies. (*See* page 177, Pressure Bandages.) The pressure should be removed every twenty-four hours, and the part scientifically massaged for twenty minutes; a suitable lubricant, such as camphor liniment, must be used. Passive movement of the limb affected is often advisable for a few minutes when the bandages are off.

Massage involves hard work with the fingers, and should be done mostly in the direction of the flow of the veins. The fingers are used in a kneading motion. It is of little use unless persevered with for twenty minutes each time, once or twice a day.

We must remove the cause of the injury and give rest to the part. We assist Nature to repair the injury. The use of purgatives and diuretics will greatly assist in removing the congestion in the tissue and blood. Give plenty of water, roots, green food, and mashes. An ounce of nitre should be given in the water, and a mild ball. As soon as the horse is convalescent he must be turned out to pasture.

External Applications.—Any drug that stimulates or irritates will increase the blood-flow in that part. This is the functional use of massaging. We draw internal inflammation out by applying an irritant to the surface over the part. Prolonged applications of hot water are not advisable, as they cause over-softening of the tissues, and increase the exudation from the capillaries (minute blood-vessels).

Cold applications, as water, ice, ammonium chloride, ether, ethyl chloride, cause contraction of the tissues and produce pressure that checks the exudation. But in acute inflammation it will be necessary to remove most of the inflammation by hot fomentations, alternated with cold applications first of all. Blood-flow is necessary for vital repair, therefore this must not be checked too much by severe refrigeration. We first remove the inflammation by cooling medicines, lotions and irrigation, and low diet; then if necessary, we blister.

Stimulating Liniments:

1. Spirits of Ammonia (dilute ammonia)
   Methylated spirits (wood alcohol)
   Oil of Turpentine
   Take 1 oz. of each and add 3 oz. of olive oil. Mix well.
2. A.B.C. Liniment:
   Tincture of Aconite
   Tincture of Belladonna
   Chloroform
   Take 1 oz, of each and mix well.
3. Compound Liniment of Camphor:
   Camphor 1 part
   Liq. Ammonia fort. 2 parts
   Alcohol 6 parts
   Dissolve the camphor in the alcohol first.
4. Liniment of Ammonia:

Liq. Ammonia fort.	2 oz., or	60 c.c.
Alcohol (meth.).	4 oz., or	120 c.c.
Oil of Linseed	1 pint, or	500 c.c.

5. Soap Liniment:

Soft soap	2 parts
Water	4 parts
Camphor	1 part

Alcohol, sufficient to dissolve the camphor, before adding the soap and water.

6. Iodine Liniment:

Tinct. Arnica	1 oz.,	or	30 c.c.
Tinct. Opium	½ oz.,	or	15 c.c.
Spir. Camphor	½ oz.,	or	15 c.c.
Alcohol	1 dr.,	or	4 c.c.
Aether	1 dr.,	or	4 c.c.
Tinct. Aconite	½ dr.,	or	2 c.c.
Tinct. Iodine	½ oz.,	or	15 c.c.
Water	to 2 pints,	or	1,000 c.c.

7. Strong Iodine Liniment:

Iodine	2½ parts
Pot. Iodide	4 parts
Camphor	½ part
Alcohol	20 parts

Paint on with brush.

Sprain of the Back-Tendons and Ligament of the Leg. (*See* page 249.)—The *suspensory ligament* lies posterior to the cannon bone. It extends from the back of the knee and bifurcates above the fetlock, and is attached to the outside of the sesamoid bones; it then passes round the side of the pastern and joins the extensor pedis tendon at the lower part of the large pastern bone (suffraginis). It is the most important ligament in the body and supports the leg, maintaining the normal slope of the pastern. It should feel hard and firm. It is usually sprained at the bifurcation, its weakest part; when it will be swollen, soft and hot. The horse will be quite lame at the trot and may go on his toe. In a complete rupture the fetlock will go right down. The fore-leg is usually affected in galloping horses; the hind-leg in draught horses. The cause is a severe stress, usually unexpected, when the horse's muscles are not prepared to receive the shock.

The *perforans tendon* is situated behind the suspensory ligament. The flexor pedis perforans muscle originates near the elbow or the stifle; the tendon commences above the hock, and passes down the groove in the back of the joint; passes through the perforatus tendon behind the fetlock under the Navicular and is attached to the back of the pedal bone. It flexes the foot, pastern and fetlock joints.

The *perforatus tendon* lies behind the perforans. The flexor pedis perforatus muscle lies close to the perforans. The tendon is attached to the prominence at the back of the hock and the knee, and is called the tendon of Achilles. It is perforated by the perforans tendon and inserted to the back of the small pastern bone (coronæ). It flexes the pastern and fetlock joints.

When sound, these tendons feel hard and tense; when sprained, they are large, round, soft and hot. There will be lameness. The perforans is more often sprained. The sprains may be caused by severe draught work or jumping in heavy ground. With either tendon injured, the horse will keep the weight off the heel.

The *check ligament* joins the top of the suspensory ligament at the knee to the perforans tendon half-way down the cannon. It therefore joins the pedal (foot) bone to the back of the knee and assists the suspensory ligament in supporting the weight on the limb when the fetlock is down.

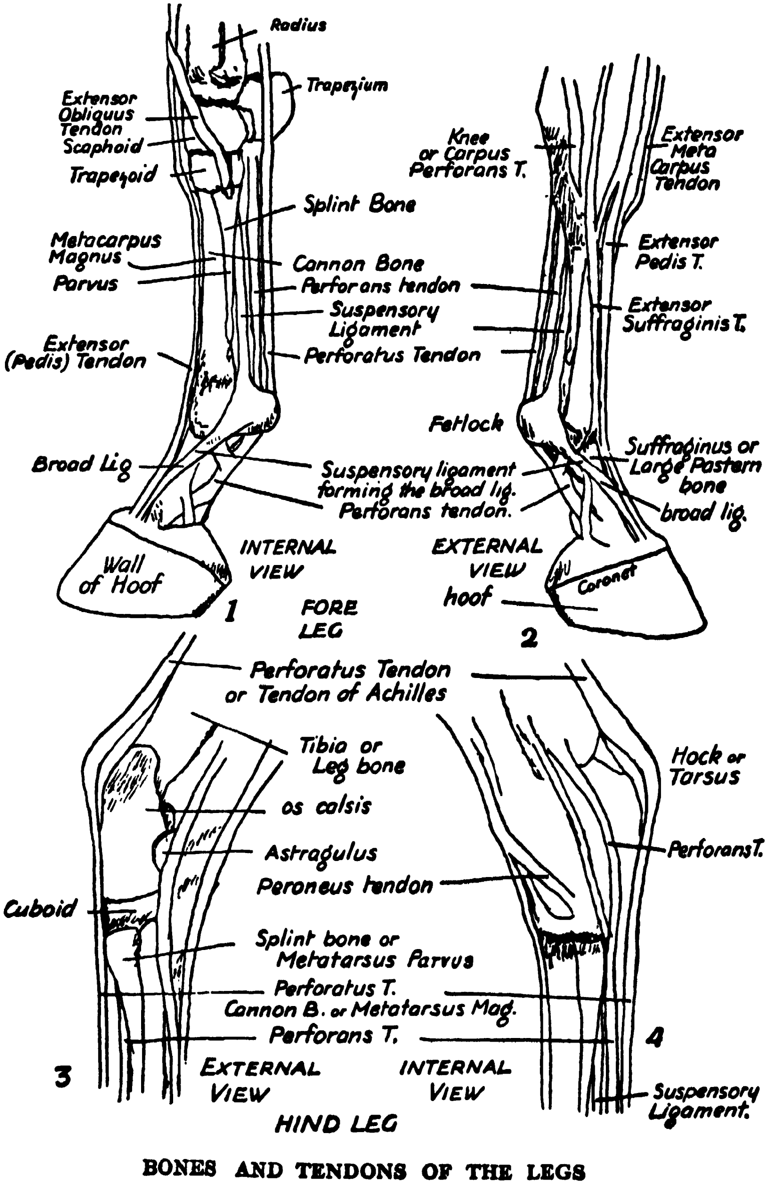
Sprain of this ligament occurs when uneven ground or a small hole produces a sudden shock upon the limb which the muscles are not prepared to absorb. The injury is usually at the junction of the check ligament and perforans tendon. There will be heat, swelling, softness and pain. Swelling may extend up to the knee, and the horse may rest the toe on ground.

Sprain of Fetlock Joint.—The ligaments surrounding the joint become sprained from a twist, severe work or concussion. There will be lameness, heat and swelling.

Treatment of Sprained Back-Tendons, Ligament and Fetlock.—Put on high-heel shoe and take weight off the back-tendons, etc. If there is much heat, apply hot fomentations for ten minutes with soap solution; apply mild liniment and massage, followed by pressure bandages. Repeat daily. If the fetlock joint only is affected, remove the shoe altogether.

Curb (Plate facing p. 224) is a sprain of the ligament at the lowest part of the back of the hock (calcaneo-metatarsal ligament), which joints the hock to the cannon. It forms a swelling about four to five inches below point of hock. Sickle hocks are subject to curb. The strain may be caused by working—especially jumping—too young; galloping over heavy ground; heavy loads. The curb causes the perforatus tendon to bulge out. The head of the outer splint bone must not be mistaken for a curb. There may be hereditary tendency.

Treatment: High-heel shoe. Good blister. Proper diet. Turn out



BONES AND TENDONS OF THE LEGS

to pasture for a few weeks after effects of blister are over. Then give light work for a while.

Sprain of the Shoulder.—Caused by falls, over-exertion in hunting or ploughing, landing over a jump, twists and turns.

Symptoms: The horse will step short, or drag his leg when backed, or when going forward. May find it difficult to passage to one side. Will probably evince pain on part being pressed. May object to passive movement of the limb.

Treatment: Rest, massage and gentle passive exercise. Cooling medicines and suitable diet. Few weeks' pasture afterwards.

For all muscle sprains: rest, massage and careful attention to the diet, form the best method of helping Nature repair the injured part.

MASSAGING, BLISTERING, FIRING, ETC.

In modern practice the chief use of firing is on bony exudates; pin-firing is the best. There are a few cases of internal injury to a joint, where pin-firing may effect a cure. But the old methods of line-firing the cannon for sprained tendons, etc., are far better replaced by modern scientific massage and pressure bandages.

Massage can be learnt by a groom, from one who understands it, in a few lessons.

For cases in which massaging is not advocated, blistering will generally be more beneficial than firing.

Sprained tendons and ligaments that are severe—curb, bog spavin, thoroughpin, etc.—are easily cured by blistering.

The chief benefit derived from the majority of firing is the enforced rest that the injured part gets.

Blistering.—The part must be clipped and grease applied well round it, to prevent the blister running. The blister is then rubbed in for from three to ten minutes. Precautions must be taken to prevent the horse licking the part; a cradle on the neck may be necessary. After twenty-four hours, or sooner if the action is considered sufficient, the part should be gently washed with warm water and castile soap, and greased with an antiseptic ointment. It may be necessary to apply grease for several days, until the part is soft and cool. The treatment can be repeated in two weeks if necessary. Blistering should never be applied while there is severe inflammation. The inside of joints, as behind the knee or pastern and in front of the hock, should not be blistered.

1. Strong blister (use with caution):

Oil of Croton	30 min.,	or	2 c.c.
Mercury Biniodide	2 dr.,	or	8 gm.
Oil of Turpentine	2 dr.,	or	8 c.c.

Parke Davis vesicant, to make 2 oz. or 60 gm.

2. Mild Blister:

Mercury biniodide	1 dr.,	or	4 gm.
Cantharides (powder)	1 dr.,	or	4 gm.
Lard to make	2 oz.,	or	60 gm.

3. Very mild liniment blister for slight curb, bog spavin, thoroughpin, etc.:

Mercury Biniodide	35 gr.,	or	2 gm.
Pot. Iodide	4 dr.,	or	15 gm.
Iodine	1 oz.,	or	30 gm.
Water, distilled	1 oz.,	or	30 c.c.
Ether to make	8 oz.,	or	250 c.c.

Paint on daily for five days. Repeat after five days, if necessary.

Firing.—Clip the part. Apply local anæsthetic to, and around it. Electric pin-firing is the most humane and scientific method. Spirit-heated pin-firers can be used where there is no electricity. Line-firing is not recommended because it has a tendency to check the circulation in places, which defeats the chief use of firing—increasing the blood-supply. In pin-firing each burn needs to go just through the hide; the points should be about half to three-quarters of an inch apart. Rub antiseptic grease in before the effect of the local anæsthetic wears off; it should be greased morning and night. With the use of a local anæsthetic (*see* page 267) there is no need for ropes or twitches; the horse will stand quietly.

BRANDING, THROWING, USE OF TWITCH

Branding.—Clip a clear patch. Heat iron in wood fire, and brush off face of iron. Apply when it has just turned red. Apply it quite flat, and only for sufficient time to burn the hide; if the tissues under are burnt the part will suppurate, and this will obscure the brand afterwards, instead of its being clearly defined. A local anæsthetic can be used, but the operation should be so quick that the iron is removed by the time the horse feels it. Carbolized lard should be applied to keep the scar soft while healing.

Throwing.—Occasions do occur when it is necessary to throw a horse. In a modern veterinary hospital an operating-table is used, on which the horse is put before being given the anæsthetic. But where such a table is not available, the horse is better quietly thrown on to a soft sheet on top of straw, or in a soft field, before being given the anæsthetic. The hobbles must be put on quietly, and care taken not to frighten or excite the horse. Place a shackle on each pastern (with ring attached); it must be made of strong leather and padded with felt, with the buckle on the outside of the leg. Put surcingle on horse, with a ring sewn in at each side. Take two long ropes; place each as follows: tie one end to fore-leg hobble, pass through surcingle ring on same side, down to hind-leg ring, and back through surcingle ring. An assistant holds the free end of each rope, and stands in front of the horse's shoulder. The horse is led by a third person one step forward, when pulling the ropes will bring the horse to his knees. He must be gentled, and then, by pulling the ropes tighter, he is brought down. The head is held firmly on the ground by the assistant's knee resting on the neck just behind the jaw. The rope is then secured.

Hobbles may be used without the surcingle; but with this method it is not so easy to get the horse down on his knees gently. Every effort must be made to avoid frightening the horse, and to prevent noise and abuse.

Twitch.—When a twitch is used, the horse must not be abused by the loop being twisted up tight enough to cause pain. The function of the nose-twitch, which consists of a loop of cord on the end of a small wooden handle which is passed over the upper lip, is to detract attention. It is too commonly used with brutality by ignorant people. If a horse will not stand still while being clipped, or while a wound is being dressed, a nose-twitch put on and only twisted up moderately will cause discomfort, but not pain, and will generally cause the horse to stand steady.

A substitute for the nose-twitch is a loop of fine cord passed over the head and into the mouth, under the upper lip, but outside the upper jaw. The loop is fastened with a slip-knot. Care must be taken, however, not to pull the loop severely, or great pain and damage may result. If held moderately tightly it only causes discomfort and the detraction, which is necessary to keep the horse still for the period required.

These means of restraint must never be allowed in the hands of inexperienced or brutal people.

LAMENESS AND INJURIES

BONE DISEASES

Inflammation and bony growth may result from mechanical injury, severe concussion or prolonged irritation. The method of treatment is counter-irritation by blistering or firing. By increasing the circulation in the part the excess bone is either removed, or else increased so as to seal the bones together (as in the case of a splint).

Splint (Plate facing p. 224) is a bony growth on the side of the splint bone (small metarcarpal or metatarsal), caused by the stretching of, and consequent injury to, the ligaments that attach the splint bone to the cannon. It is usually the result of severe work on hard roads, fast trotting, working hard when too young, etc.

Splint is more common on the inside of the leg, and may not cause lameness if well below the knee or hock.

While forming, it usually causes lameness. The little button at the lower end of the splint bone behind the cannon and two-thirds down, must not be mistaken for a splint.

Treatment: If there is no lameness, leave it alone. If there is, a good blister, with attention to the diet, is the quickest way to seal up the two bones and cure the lameness.

Bone Spavin or Jack (Plate facing p. 224) is a bony exudation on the lower part of the inside of the hock. The higher the spavin the more it will interfere with the movement of the hock, and therefore the more serious it is. There are four joints in the hock; the upper one has the most movement, the lowest one very little movement. Spavin is caused by concussion and severe work, and is generally found on fast harness-horses, hunters, and circus-horses. It is more common with young animals. The actual cause is the same as in splint.

Symptoms: The horse starts out lame behind and drags toe. Worse downhill. Lameness improves or disappears. Will be worse after a hard day's work. Will wear away the toe of the shoe. If well formed, the swelling can be seen and there will be heat and pain. In turning about, the horse will bear most of his weight on the other leg. If the hock is forcibly flexed the lameness will be increased. An occult spavin is where there is no outward sign.

Treatment: Generally easy in young horse. Use high-heel shoe. The treatment is the same as for a splint. We cannot remove the growth. Pin-firing is the best treatment. Liniment and massage may effect a cure in a slight case on a young horse.

Ringbone is a bony exudation on the pastern bones which generally causes lameness by interfering with the action of one of the joints. Commonly situated between the large and small pastern bones. More common in hind-feet; due to concussion and severe work; working too young. May be caused by horse going on his toe through lameness. (Plate facing p. 224.)

Symptoms: The deposit can generally be felt. Horse will try to avoid bending the pastern.

Treatment: In early stage absorption of the deposit by blistering or pin-firing. Turn the horse out to pasture as soon as possible to keep joints supple. Neurectomy is often the only cure for the lameness.

Sidebone (Plate facing p. 224) is an ossified lateral cartilage. (*See* page 226.) Caused by want of frog pressure and consequent damage to the structure of the foot and its normal functions; high calkins on city streets; cutting away the frog; treads and other injuries.

Symptoms: The horse goes short; foot dwells on ground. Tries to take weight on other foot. Heat and pain on pressing finger inside coronet. The hard cartilage can be felt. Normally it is quite pliable.

Treatment: Obtain frog pressure by lowering heels. Rest. Reduce wall of hoof around the cartilage. Blister the part to hasten the bone formation. Neurectomy may be necessary.

Sore Shins.—Not uncommon in race-horses worked on hard ground. The lower part of the cannon is swollen and painful in front. Treat with rest, hot fomentation, liniment, massage and pressure bandages.

Navicular Disease.—The navicular bone is a small, long, highly-vascular bone, situated at the back of the pedal (coffin) bone and under which slides the perforans tendon. It acts as a pulley and also bears weight whenever the frog is pressed upon. Generally in fore-feet. Commonly in trotting-horses. Caused by severe concussion and severe work.

Symptoms: The horse goes on his toe to avoid weight on heel. Lies down after hard work. Probably not lame at walk. Generally no outward sign. Steps short and trots as if sore. Lameness decreases with work. May go sound on snow or sand. Pressure on frog may evince pain. Diagnose by use of cocaine.

Treatment: Cannot cure. Relieve the pain by paring frog and using high heels. Keep toe short. Encourage to lie down. Work on soft ground. Stand in cold foot-bath several hours daily.

Neurectomy of the posterior digital nerve on both sides will effect a cure of the lameness.

Quittor is an abscess that runs between the wall of the hoof and the pedal bone in the sensitive laminæ. Caused by treads, blows, nail-pricks, and suppurating corns. The horse is lame.

Treatment: If lump forms and does not point, hasten with mild blister. The wound will later have to be opened and treated as an abscess. Syringe out to bottom of wound. May be necessary to make an opening through wall under local anæsthetic.

SYNOVIAL ENLARGEMENTS

Windgalls.—A puffy, flabby enlargement around the fetlock; generally near back of joint.

Caused by weakness; severe work with young horse; overwork; suddenly stopping severe work causes the excess of synovia produced to stretch or rupture the synovial sheath. Generally no lameness.

Treatment: Avoid checking work suddenly. Massage and pressure bandages.

Bog Spavin.—Distension of the synovial membrane on the front of the true hock-joint (bottom of leg bone, or tibia). Caused by working too young, severe work or weakness. Generally no pain, and often no heat.

Treat with massage, pressure bandages and rest, and suitable diet.

Thoroughpin.—Distension of the sheath that surrounds the perforans tendon, just in front of the point of the hock. The swelling can be moved from side to side with the fingers. Often occurs with bog spavin. Cause and treatment, same as bog spavin. The Thoroughbred Hector had a bad thoroughpin, and won over £3,000 in stakes.

Distension of bursæ surrounding tendons is not uncommon. Treatment is same as for windgalls. In all synovial swellings, potassium iodide, 1 dr. a day for a week, will assist in absorption. May be necessary to blister.

SEROUS ENLARGEMENTS

Capped Hock.—Caused by kicking in stable or train. The serum escapes from the blood, and if not reduced the swelling will turn into fibrous tissue.

Treatment: Remove cause and massage with strong liniment. May have to be opened to let serum out. Absorbing iodine liniment or blistering will effect a cure.

Capped Elbow or Shoeboil.—Situated at point of elbow. Caused by lying on heel of shoe or of foot. Tying up too short at night may cause this. A horse with thrush will often lie on the heel.

Treatment: Remove cause. Put big sausage-anklet on pastern at night. Treat as for capped hock. Can be removed by ligature or by complete dissection under general anæsthetic. Very liable to recur.

Serous enlargements may be removed by painting twice a day until a scab forms, with the following:

Churchill's Iodine	2 dr.,	or	8 c.c.
Tinc. Cantharides	2 dr.,	or	8 c.c.
Spts. Camphor	1 oz.,	or	30 c.c

When scab forms, keep it well greased.

FRACTURES AND DISLOCATION

In a *simple fracture* the skin is not broken; in a *compound fracture* it is, and the break becomes also a wound; in a *comminuted fracture* the bone is broken into many small pieces.

In the case of a compound fracture it is more humane to destroy the horse. Some simple fractures can be set in plaster of Paris, and a perfect cure effected. It depends on the location, and how much it is possible to give the horse proper rest by slinging him, etc. If the horse is valuable, it will be worth the trouble and expense. Mares can be used for breeding if the limb does not become quite sound.

The irritation produced by a fracture causes the bone-producing cells to seal together the broken ends and to cover the joint with surplus bone (like a lead-pipe joint); then bone-devouring cells begin to work and remove most of this excess bone, inside and out.

Calcium phosphate, 2 dr. a day, will hasten the bone formation. Rest is essential and laxative diet.

Comminuted fractures usually occur in the pastern or pedal bone, and generally a cure is doubtful and painful.

With a simple fracture of a limb, where plaster can be put on, it is first necessary to bring the ends of the bone properly together. To do this it may be necessary to give the horse a general anæsthetic (*see* page 265), in order to get relaxation of the muscles; but this involves throwing or the use of the operating-table, which adds to the difficulty. A cotton bandage is then put on fairly tightly to cover the hair, then plaster-of-paris bandages, well soaked, are wound round until a thick cast is made for about six inches on each side of the fracture.

It may be necessary to sling the horse for a few days; but if the cast is holding the bone securely in place, the horse can often be left in a large loose-box.

The cast should be left on for three weeks at least.

If the pedal (coffin) or navicular bone is broken, it is advisable to destroy the horse. There will be much heat in the foot, and pain; the elbow will be held low, knee bent, heel raised.

Fracture of arm (humerus), shoulder-blade (scapula), and the ribs, generally repair quickly if the horse is rested in a loose-box, and given proper diet.

A fracture of the thigh bone (femur) necessitates slings.

The inside of the leg bone (tibia), just above the hock, is unprotected by muscle; the bone can be felt. It is common for a horse to be kicked on this part. In the event of a severe kick, the bone may be cracked and appear normal. The safest plan is to put the leg in a plaster cast for eight days; because a bad crack would break if the horse laid down and tried to get up.

Dislocation of the Patella, or knee-cap, at the stifle. Generally slips outwards. Common with foals galloping about. The leg will be held straight, toe on ground and dragging behind. The bone should be replaced as soon as possible by being forced into position with the hand; it may be necessary to have the leg drawn forward with a strap, to get the bone to slip back. The part should be massaged twice a day for several weeks afterwards.

ANTISEPTICS AND ASEPSIS

Successful surgery or treatment of wounds was not possible before the isolation of disease-producing germs. Disease refers to an abnormal condition of a tissue, brought about either by mechanical means, as a sprain, cut, blow, and improper diet (diabetes and liver diseases) and overwork, etc. (nervous and heart diseases), or by micro-organisms. Diseases produced by micro-organisms are contagious or infectious. Micro-organisms microbes, or germs, are animal (protozoa) or vegetable (bacteria, yeasts, moulds, fungi). Only 2 per cent. of the germs in the world are disease-producing. The remainder carry out most important functions on the farm, in the air, and in industry. Wine, cheese, vinegar, and gelatine are made by germ action.

Plants and the lowest forms of animal life could not exist without bacterial and other germ action. They break up all dead matter into its component chemical parts.

The extraction of nitrogen is the most important chemical action produced by germs. The germ splits up dead protoplasm into its chemical parts ; plants re-form protoplasm from the chemicals. Animals eat the plants. The germs that live on dead matter are called saprophytes. Germs that are parasitic and also produce disease, are called infective agents. These concern us in dealing with asepsis. A disease-producing germ, whether animal or vegetable, is termed pathogenic. A germ may be pathogenic to one animal, but non-pathogenic to another.

The effect of pathogenic germs on a subject depends on various conditions, such as age, fatigue, health, nervous condition, the blood, etc.

Bacteria concern us chiefly here; they are either bacilli (rod-shaped); cocci (spherical); or spirillæ (spirals).

They are able to multiply asexually at a most alarming rate; the tuberculosis bacillus can divide into two germs in half an hour. Over sixteen millions can thus be produced in twelve hours.

Pathogenic microbes enter the system through the respiratory tract, alimentary canal, genital organs, eye, navel (umbilicus), wounds and bruises.

Microbes produce disease by forming toxins (poisons), which enter the blood; by forming toxins while in the blood-stream; or by destroying tissue cells and the blood-corpuscles.

The average size of a bacillus is $\frac{1}{12000}$ in. in length by $\frac{1}{50000}$ in. in diameter, which is very many times smaller than the red blood-corpuscle, which is much smaller than the white (leucocyte).

It is very exceptional for germs to enter the system through hair follicles or sweat-glands. Under certain conditions they can pass in between the cells of internal tissues. In the intestines they can pass through the walls with the globules of fat.

Ordinary nourishment filters through the cells of the intestinal walls by a process known as osmosis.

Normally the skin is proof against the admission of microbes. Lymph and mucus are antiseptic; so is saliva and perspiration to a mild degree. Lachrymal secretions (tears) are also slightly antiseptic. The conjunctiva of the eye is irrigated. The hairs of the eye-lashes, nose, etc., assist in keeping germ-covered dust away. Before it enters the lungs, the air is filtered in the nasal chambers. The gastric juices are antiseptic, so is bile, slightly.

If the germ passes all these barriers and reaches the blood, it meets the white blood-corpuscles, which are the scavengers of the body; and also chemical antitoxins in the blood-stream, known as opsonins. The quantity and type of opsonins in the system determines the state of that individual's "opsonic index." (Greek = prepare for.)

Different animals and different individuals possess immunity to certain diseases. Active or passive immunity can be acquired by inoculation. In the former, a mild form of the disease is produced by the introduction of the living microbe (e.g. vaccination against smallpox); in the latter, antitoxins are introduced (e.g. tetanus). This is done by injecting an emulsion of dead bacteria, or chemicals produced by bacteria in the laboratory, or chemicals produced from dead bacteria.

A bacterial vaccine is a sterile culture of bacteria in solution. The immunization against diseases by bacterial vaccines is one of the most important medical discoveries that affect the live-stock industry.

The physiological action is that when a vaccine prepared from the germs of a certain disease is introduced into the animal or human system, the antitoxin for that particular disease is produced in the blood. This is due partly to the white blood-corpuscles and partly to chemical action.

The introduction of millions of dead, pus-producing germs produces the same beneficial effects in horses in all cases of blood-poisoning, abscesses, infected wounds and nail-pricks, fistulous withers, poll evil, scratches, etc. Much useless pain from the use of the knife can now be dispensed with by the timely and judicious use of these bacterins.

There are many ways of destroying disease-producing germs outside the body; intense cold or heat, fresh air, sunlight, pure water and various chemical agents called germicides, antiseptics or disinfectants. Fortunately most bacteria, when removed entirely from their host, very soon die. There are two exceptions: the tetanus and anthrax germs, which may live indefinitely. The former are commonly found in clay soils, hence the need for precautions when a horse is wounded or pricked.

Common disinfectants:

- Acid boracic, very mild; dusting-powder.
- Acid carbolic, pure; 3 to 5 per cent. solution.
- Acid tannic.
- Æther, internal.
- Alcohol, 60 per cent. solution equals 3 per cent. carbolic.
- Chlorinated lime.
- Creolin, 3 to 5 per cent. solution.
- Cyllin, 1 to 2 per cent. solution. (Jeyes' Fluid.)
- Formalin is 40 per cent. solution of gaseous formaldehyde; formic aldehyde; methyl aldehyde.
- Hydrogen peroxide, 1 to 10 water; for open joints and abscesses.
- Iodine tincture.
- Izal, 1 to 3 per cent. solution.
- Lysol, 1 to 2 per cent. solution; valuable in surgery.
- Mercury perchloride (corrosive sublimate), 1 to 500; 1 to 1,000 for wounds.
- Pot. permanganate; solution colour of claret.
- Salol (phenol salicylate); intestinal, and dusting-powder.
- Sodium chloride (common salt).
- Sodium hyposulphite (hypo); for blood-poisoning; internal.
- Turpentine, internal.
- Zinc sulphate, used in lotions.

The best disinfecting solutions for wounds are those of the coal tars (creolin, Lysol, cyllin, Izal, etc.); and the best dusting-powders are salol and boracic.

For drains, the above coal tars and carbolic acid; and chlorinated lime or Jeyes' powder for sprinkling over insanitary areas.

Crude carbolic is only very slightly soluble in water and is therefore of no use for making disinfecting solutions.

A solution of creolin, etc., should resemble weak milk; if it does not, then the creolin is not sufficiently soluble, and is of no use for solutions, although soluble in glycerine.

With Lysol, a very strong soapy solution can be made, as it is very soluble. It is particularly suitable in parturition cases.

Aseptic Treatment of Wounds and Injuries.—Modern surgery aims at asepsis rather than the use of strong disinfectants. Without asepsis—the absence of harmful germs—successful surgery is impossible, and the healing of cuts, punctures, abscesses, etc., is impossible also.

Lord Lister revolutionized surgery and the treatment of wounds by his discovery of antiseptics.

Wounds are classified thus: Cuts, tears, punctures and bruises. Torn wounds heal most slowly. Punctured wounds are the most dangerous, on account of the difficulty of reaching to the bottom of the hole, and of the ideal conditions established therein for the cultivation of germs.

Bruised wounds are common with horses and are difficult to heal; broken knees, galls, treads, over-reach, brushing and quittor are common examples.

In treating a wound we must assist Nature to do the healing, by removing any action that will hinder her

First, we must arrest the bleeding by styptics, pressure, cold applications, cautery, ligature, or by closing the blood-vessels with the forceps.

Clotting of blood (the formation of fibrin) is a complicated chemical action and takes about two minutes.

Any foreign matter must be carefully removed from the wound. A free flow of blood is an excellent safeguard against dirt and germs remaining in a wound.

Plugging up a wound with dressings will only increase the heat, and therefore the bleeding

We must endeavour to apply pressure to a bleeding artery on the heart-side of the wound. It may be necessary to take hold of the end of the artery and close it with the forceps or to tie it with silk.

Ragged bits of the wound may have to be removed. The wound then should be irrigated with a syringe and a disinfectant. If there is much surface bleeding, an astringent, such as dilute tincture of iodine, or white lotion, should be syringed on.

Rest of the part is essential, and sufficient dressings must be applied to exclude foreign matter. The wound should be redressed night and morning, because a certain amount of pus will form.

Great care must be taken to prevent a wound healing up too soon. It must heal from the bottom.

Good drainage from the bottom of a wound is essential to prevent the enclosure of pus as it heals up. To secure this it is often

If a wound heals up too soon *it will have to be opened again, or blood-poisoning will follow.*

The pus formed is produced by bacteria (streptococci and staphylococci), which are present in the air.

It may be necessary in some wounds to draw the edges partly together with the needle and silk; but a wound must never be sewn up tightly.

Wounds on the coronet and pastern are slow in healing, owing to the mud. Potassium permanganate solution is a good disinfectant, which should be applied until pus ceases to form. Boracic acid should be dusted on. Any dead tissue should be removed.

Very deeply-seated wounds can be flooded with a solution of iodine crystals 3 dr., and ether 6 oz. (1 to 16.) This is very good where drainage is poor; the ether evaporates and leaves a coating of iodine in all the crevices.

Whenever possible a warm antiseptic bath should be used; it is particularly useful for injuries to the lower parts of the legs.

If a wound surface is washed quite clean of albuminous matter with ether, it is possible to sterilize it with a single application of an antiseptic. A physiological solution of salt (·85 per cent.), or a hypertonic solution (5 per cent.), and salt-packs of saturated solutions of sodium chloride, are used with much success in wound treatment.

Proud flesh, which often forms round a wound, is removed by the use of copper sulphate crystals.

Blistering a cut, such as a broken knee, will cause contraction and hasten the healing.

Contusions and bruises must be treated antiseptically; and then with liniments and possibly massage.

Particular attention should be paid to the diet of the horse. Laxatives (a mild ball) should be given, and diuretics in the water.

If the wound has been neglected it will be advisable to give the anti-tetanus injection: 3,000 units of fresh anti-tetanic serum.

Sewing Wounds.—Sewing should only be resorted to if it is absolutely essential. Sterilized curved surgical needles and silk should be used. The stitches should be kept half an inch from the edge of the wound, and be half to one inch apart. Single stitching is preferable to continuous. Each stitch is knotted with a double reef-knot. Always have perfect drainage, and leave room for insertion of syringe for irrigation.

Dressings.—These must be absorbent, to hold the lymph for the nourishment of the new cells, and also perforated to allow for good drainage.

Drainage tubes may be necessary. The more the fresh air has access to a wound the quicker it will heal.

A wound can be retarded in the rate of healing by keeping the dressings wet; they should be covered with oiled silk-sheeting. Dry dressings and dusting-powders hasten the healing.

Dressings should be replaced every 12 to 24 hours. Flies must be kept away from a wound by the use of iodoform, eucalyptus etc., if necessary.

Aseptic Precautions in Operating.—All instruments must be thoroughly scrubbed clean, and then sterilized for three minutes in boiling water. The table-top and trays used must be aseptic. The operator should wear surgical gloves; if not, then his finger-nails and hands must be scrubbed with strong antiseptic soap. No one whose hands are not so treated must touch the instruments or any part of the apparatus or dressings. Sponges must never be used. Cotton tufts and cyanide gauze and sterile bandages only.

A general or local anæsthetic must be given, and this will obviate any necessity for haste; and a scientific operation can be performed with all voluntary muscles relaxed.

Abscess is a collection of pus in a cavity, the result of internal or external injury. The pus-producing germs attack the cells of the tissue.

The part will be tender, hot and swollen. It will be hard at first, but, as the pus forms, will become soft. The swelling should be hastened in "pointing" by hot fomentations. It may be necessary to lance it later. The wound will then be treated antiseptically.

The diet must be attended to and laxatives and diuretics given.

OTHER INJURIES

Brushing.—The horse strikes the fetlock, coronet or hoof with the inner border of the hoof or shoe of the opposite foot.

Cause: Foot unlevel, throwing fetlock too far in. Weakness, bad conformation, fatigue, bad shoeing. A horse that stands with his toes out is liable to brush.

Symptoms: Possibly only a slight mark. May be a cut, heat-swelling, or even an abscess.

Treatment: Remove cause. Shoe with feather-edged shoe on striking-foot. Keep outer wall of other foot low. Use Yorkshire boot in future. (*See* page 184.)

Speedy-cut.—The horse strikes himself on the lower part of the inside of the knee. Similar to brushing. A severe blow may cause an abscess. Wear a speedy-cut boot. Shoe as for brushing.

Over-reaching.—The toe of a hind-foot strikes the bulb of the heel in front, or the fetlock, or even the back-tendon. Generally done at the gallop on heavy ground or while jumping. May be caused by weakness or fatigue.

Treatment: Treat the wound. Work more carefully when healed. Use rubber jumping boots or balls on fore feet.

Broken Knees.—Generally caused by careless riding or driving, or result of careless training. Fatigue, bad roads and falls may cause them. If joint is not affected, treat as a wound. Prevent the damage spreading into the joint. Avoid much hot fomenting.

An open joint must be kept as still as possible, and be kept aseptic with fresh dressings every 24 hours. When the wound is quite clean, tincture of iodine should be applied. A blister round the part will assist healing.

The following dressing may be applied:

Zinc Oxide	5 parts
Castor Oil	5 ,,
Collodion	40 ,,

When the knee is only swollen, and not cut, reduce it by massage and the following liniment:

Lead Acetate	1 oz., or	30 c.c.
Methylated Spirit . . .	1 pint, or	500 c.c.
Water	3 pints, or	1500 c.c.

Poll Evil.—Caused by a blow, striking the head against a low roof, tight over-head check-rein. (*See* page 132.)

Symptoms: Horse tender about top of head. Swelling, heat and pain. The yellow elastic ligamentum nuchæ is affected.

Treatment: Remove cause. Apply antiphlogistine. Open abscess and treat wound. If very mild it may be treated from the first with liniment. Feed horse from manger only, so as to keep the head up as much as possible.

Fistulous Withers.—Caused by saddle or collar pressure. The ligamentum nuchæ is affected and is difficult to heal. Treat as for poll evil. Be careful to get drainage.

Thorns.—Wet the leg with warm water; run hand down gently. It may be necessary to slit the skin to remove thorn; if left in it may cause poisoning.

Swellings.—If a leg swells up suddenly and becomes hot, and later the swelling becomes tense, it is probable that a splinter or thorn, or other foreign substance, has entered. This must be carefully searched for and cut out, and, if possible, the part put in warm antiseptic bath. Attend to diet and give purgative.

Burns.—The best application for burns is a solution of tannic acid in water (1 to 40); and picric acid solution is good. Failing either, apply grease or zinc ointment at once to keep the air away. Infection can readily gain entrance through a burn. Carron oil (linseed oil and lime-water) is effective. If animal suffers from shock, give stimulants such as aromatic spirits, whisky, etc.

Frost-bite.—Apply snow to the part with vigorous massage, to restore circulation. Keep out of warm stable until this is effected. Salt used on tramway tracks may cause frost-bite to the feet, and produce thrush. (*See* page 239.)

Snake-bites and Stings.—Apply liquid ammonia (spirits of hartshorn) and treat aseptically. Poisonous snake-bites have been treated successfully with repeated small injections of strychnine near the bite.

Lightning and Electric Shock.—Apply stimulating liniment to the head and spine. Give 6 oz. of whisky in water as a drench; 1 grain strychnine hypodermically. Hold ammonia bottle under nostrils. Rub and bandage legs. Warm-water enema.

Tar on Legs.—Pack with clay or mud and peel off when dry. Do not try to remove the tar with a solvent, except olive oil.

ANÆSTHETICS

Sir Humphry Davy, in 1799, discovered the anæsthetic properties of laughing-gas (nitrous oxide, N_2O). Chloroform ($CHCl_3$) was first made in 1831, but it took many years before the use of an anæsthetic became general. Some fatal experiments made the medical profession wary of this humane discovery. But so far as horses are concerned, it is only quite recently that its use has become general.

Even now, it is quite common to find veterinarians who are not willing to give an anæsthetic, either to save expense or because of lack of knowledge and practice in administering the drug. Fortunately veterinary colleges are now teaching its general use; and owners of horses should insist on an anæsthetic whenever a painful operation is performed, however slight.

No scientific operation can be performed upon a horse that is roped and struggling to get free; and such inexcusable brutality should be eliminated. Under a general anæsthetic the muscles are all relaxed, the patient lies quiet and peaceful, and a scientific operation can be performed in a minimum of time, while there is no danger of the operator being kicked or hurt by the struggles of the suffering horse.

Anyone who has had any experience in giving general anæsthetics to a horse knows well how easy and safe it is. It is also cheaper, because time is money to the busy surgeon.

Anæsthesia is either general or local.

Chloroform is always used for general anæsthesia in the horse. Ether is not suitable on account of its highly stimulating effect in the early stages, and it is, besides, more nauseating. There are three stages of anæsthesia: firstly, the stimulative, when the horse appears excited; secondly, the sedative or hypnotic stage, with complete calmness, but not insensibility. The eyeball will reflex to touch. The operation must not be performed while in this stage. And thirdly, anæsthesia, with complete relaxation of voluntary muscles, insensibility to pain, and loss of consciousness.

Although suffocation from ether is impossible, it is quite possible when chloroform is used if an abundance of fresh air is not provided.

The chloroform should be given on an empty stomach. The horse should be laid on an operating-table, or quietly thrown (*see* page 252) on to a sheet laid over a soft bed.

The nostrils, lips, etc., must be greased to prevent burning. An easy method of administering the chloroform is to put a cotton nose-bag on with the bottom open; to insert a large tuft of cotton wool near the muzzle; on to this the chloroform is poured. If two ounces of chloroform are given as a drench beforehand, the patient will go under quicker.

A blinker should be put on the under-eye to prevent the horse rubbing his eye on the sheet, should he struggle in going under or coming out.

A small hole in the bag will assist in the pouring of the chloroform on to the cotton wool.

The head must be stretched out so that there is perfect freedom in the throat.

Six to ten ounces should be sufficient for a horse of 1,000 lb., for an operation lasting 15 minutes. The chloroform must be fresh. The horse will take 10 to 15 minutes to go completely under.

The breathing must be carefully watched, and the pulse continually taken at the lower jaw. No attempt should be made to hurry the anæsthetizing. As soon as there is no reflex action on touching the eye-ball, the patient is properly under. Eight to sixteen ounces of chloroform will be required for a half-hour operation.

Uneven or stertorous breathing denotes that more fresh air is required. Breathing through the mouth, which is quite abnormal in the horse, shows that the horse is not getting enough fresh air. Action must be taken at once.

Great care must be taken that no chloroform gets into the nostrils; it will burn. It will only be necessary to drop on sufficient chloroform to keep the horse under. It is usual to remove the hobbles as soon as the horse is insensible.

Should the horse show signs of suffocation or collapse, the nosebag must at once be removed, and strong ammonia on a sponge be held at the nostrils. One or two grains of strychnine should be injected hypodermically. An overdose of strychnine in such cases will do no harm. A few drops of dilute hydrocyanic acid (prussic) on the back of the tongue is also advisable.

After the operation, remove the nosebag and allow the horse to come round. This will take sometimes over half an hour.

Quivering of the shoulders is not unusual. On drawing back the eyelid the pupil of the eye will contract if the horse is coming round all right.

The horse may behave strangely at this time; kick his legs violently and throw his head to and fro. Care must be taken to prevent him injuring himself. He should never be left to recover unattended.

It is hoped that the Animal Anæsthetic Act will have the desired effect of eliminating much of the cruelty that horses have suffered in the past, by being operated on without any form of anæsthetic.

Local Anæsthetics.—The commonest and best method of producing local anæsthesia is by the hypodermic injection of a drug that temporarily paralyses the nerves at the seat of injection. The drugs are: cocaine, cocaine and adrenaline mixed, eucaine, quinine and urea, stovaine, anæsthaine, apothesin, novocaine and butein.

The part is injected in one or several places over the nerves on the spinal-cord side of the seat of operation.

Injections in some cases are made in several places over the actual seat.

For neurectomy on the lower part of the leg, the injection is made on each side, just behind the cannon below the knee or hock; or lower down if the operation is to be on the pastern.

For straightening the tail, the injection is made at the root of the tail in the dock on both sides.

The injection should be given 15 minutes before the operation, and should consist of :

One to five grains of cocaine hydrochloride, or the other drugs mentioned, made up freshly in a 5-per-cent. solution of distilled water. Prepared local anæsthetics have the normal dosage on the label of the bottle.

Cocaine has a toxic effect, which most of the more modern drugs have not.

Quinine and urea hydrochloride (1 to 5 grs.) is a very valuable local anæsthetic that has no toxic effect, and the anæsthesia lasts longer.

Four grains of cocaine and adrenaline, injected all round the leg above the fetlock, will give perfect anæsthesia for pin-firing a ringbone.

Some of these drugs are sold in solutions equivalent to a 5-per-cent. solution of cocaine. 1 gr. of cocaine in 5-per-cent. solution equals approximately 20 minims, and 5 grs. equal 100 minims. 20 minims equal about 1¼ c.c. and 100 minims nearly 7 c.c.

For removal of foreign matter from the eye, where complete relaxation is necessary, a few drops of a 1-per-cent. solution of cocaine are dropped in; this will take effect in 10 minutes.

HUMANE DESTRUCTION

The most humane method of destroying a horse is to shoot it. If this is done properly it causes instant unconsciousness and death. If lines are drawn in imagination from each eye to the opposite ear, the point of meeting is the place at which the bullet should enter. The bullet should be directed upwards, by holding the revolver a little down. There may be twitching of the muscles.

The brain of the horse is behind the forehead, and not between the eyes, as so commonly thought.

It is better to use a revolver of ·45 calibre.

The humane-killer is an excellent instrument in the hands of one not accustomed to a revolver.

I do not recommend destruction by the use of an overdose (10 to 20 grains) of strychnine. This poison causes a horrible death.

It is far better to have a horse humanely destroyed than to sell it to end its days in abuse and discomfort. It is criminal to sell a lame horse or one that is too old to earn its living.

CHAPTER XI

THE HORSE IN SICKNESS

OCCASIONS often arise when a veterinary surgeon is not available, and where a sound, practical knowledge of the necessary treatment may save a valuable horse. There are many occasions too when it is not necessary or economical to call in veterinary aid, and the horseman who has knowledge of the correct care of the sick horse will be most valuable. In large stables it is usual to have a stud groom or foreman, who should most essentially have a very thorough knowledge of the action to take in cases of sickness or of suspected sickness.

This Chapter is intended to help in such cases.

The Temperature.—Taken at the anus. The thermometer should be wetted with the saliva and inserted well in, gently along the index finger. The mercury must be shaken down to about 98° or lower, by holding the thermometer firmly in the fingers, and shaking it with a jerk. It should be left in for one minute; a good thermometer registers in about half a minute. Wash it in an antiseptic after use. Keep in metal case provided.

The normal temperature is 100° F. or 38° C. A mare or a young horse may be half a degree higher. In the evening, during hard work, during digestion and in a hot atmosphere it may also be a little higher. Drinking cold water and a cold atmosphere will lower it somewhat.

The Pulse is taken generally by pressing the tip of the first finger gently on to the submaxillary artery, which passes under the lower edge of the lower jaw, a little in front of the angle of the jaw. The artery is felt just inside the ridge. Three vessels pass under the bone: the artery in front, then the vein and then the steno duct that connects to the parotid gland.

Normal pulse is 36 to 40 beats a minute. It should be full, plump and steady. A wiry pulse is one in which the artery feels hard and thin. It will be slow in old age, in times of fatigue or excessive cold. It is increased in fever, when it may go up to 100 or higher. It is irregular in heart disease. In the young foal it will be from 70 to 90. In a three-year-old it will be 45 to 50.

The Heart Sounds.—Taken by holding the ear against the chest behind the elbow, with the leg held forward. It is well to use a stethoscope. The sounds are: *lubb-dupp—lubb-dupp*. The first is a long, booming sound, due to the contraction of the ventricles; the second, a short sound, due to the closing of the valves above the auricles. This period (the systole) occupies three-fifths of a cardiac cycle. Then the auricles and ventricles relax and allow the heart to fill; this period (the diastole) occupies two-fifths of a cycle. (*See* page 209.)

The Respiration is taken by watching the flanks from behind. Normal rate at rest is 12 to 15 per minute. Each respiration must be a steady, single movement.

The lung murmur is heard at the side of the chest. An inspiration is louder than an expiration. The murmur is caused by the friction of the air in the air sacs and minute tubes. It should be a soft, moist purr, free from jerks or harshness. The murmur ceases for a short period at the end of each expiration.

The Urine.—This is normally cloudy. It contains 90 per cent. water, 7 per cent. organic and 3 per cent. inorganic matter. On an average a horse excretes only 8 to 10 pints per diem.

It is normal for a horse to assume an awkward, straddling position and to grunt when passing urine.

If the horse will not stale, see if the sheath is clean. Is there an injury to the penis or sheath? Is it due to nervousness or fear of splashing his legs? Shake some bedding under his belly.

The Dung.—Normally the dung is neither constipated like that of a dog, nor fluid like that of cattle. It is moderately soft, well formed and brittle, light in colour, moderately damp, and free from odour and slime. Its state is a valuable guide to health. It contains about 24 per cent. solid matter. The normal amount excreted per diem is from 35 to 40 lb. per 1,000 lb. weight.

The Membrana Nictitans.—This is the mucous membrane, situated inside the eyelid of the horse. Its normal colour is pale pink; in fever, red; anæmia, white; liver trouble, yellow. It is exposed for examination by pressing the first two joints of the first finger on to the top of the eyelid, and with the use of the thumb the lid is inverted. The colour of a healthy horse's membrane should be studied.

Tracheotomy.—In certain diseases of the throat, in a severe attack of strangles, and in bad laryngeal roaring, tracheotomy may have to be resorted to, in order to save life. The tube must be made aseptic by sterilizing. A local anæsthetic should be used. (*See* page 267.) The incision is made half-way down the neck through one cartilage ring of the wind-pipe (trachea) and half-way through the ring above and below; a notch must be cut in the latter two. The sterilized finger should be inserted into the hole before the tube is put in. This should be removed and cleaned once a day.

Balling.—Drugs are commonly given in a ball wrapped in waxed paper, or a hard gelatine capsule. A ball is made of powdered drugs mixed with liquid. The capsule is used for liquid drugs in small doses of one ounce.

To give a ball, take hold of the horse's tongue with the left hand and gently draw it out of the mouth a little, so that the horse cannot close his mouth. Take the ball in the fingers of the right hand, held squeezed together. With the sleeve turned well up, quickly insert the ball and drop it over the back of the tongue into the foramen cæcum, in front of the pharynx. At the same instant, let the tongue go. As the tongue is drawn in, the ball will be swallowed. Mucus glands oil the ball en route down the gullet. Do not frighten the horse; make him associate being balled with nice sensations. The size of a ball must not exceed 3 ins. by 1 in. in diameter.

Drenching.—A drenching-bottle should hold at least a pint, and may be a strong glass mineral-water bottle.

The horse's head must never be tied up. It may, however, be held up with a rope on the head-collar, which passes over a pulley above the horse, so that the head can be lowered at once should the horse choke. A horse can close the back of his mouth and hold liquids there. The horse must be taken very quietly. It requires considerable patience to administer a drench properly, so that the horse will not be made to dislike it next time.

The drench must be diluted so as not to burn the mouth. A little wastage should be allowed for in mixing up. After a mouthful has been poured in by inserting the neck of the bottle into the mouth, through the interdental spaces (the bars), the horse should be allowed to swallow it. Do not rub the neck. If he refuses to swallow, press up the hyoid bone; this can be felt in between the rami of the lower jaw.

Never drench a horse through the nostril.

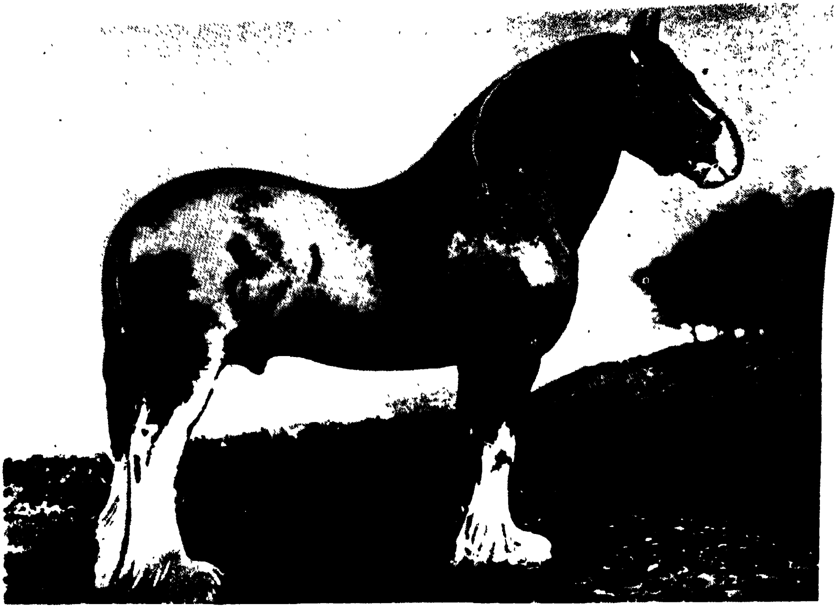


Photo: Brown,

CLYDESDALE: DUNURE FOOTPRINT

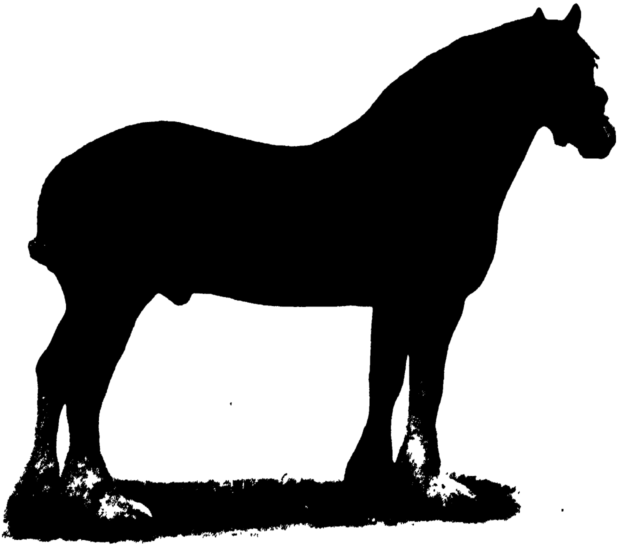


Photo: Brown,

CLYDESDALE: BARON O'BUCHLYVIE

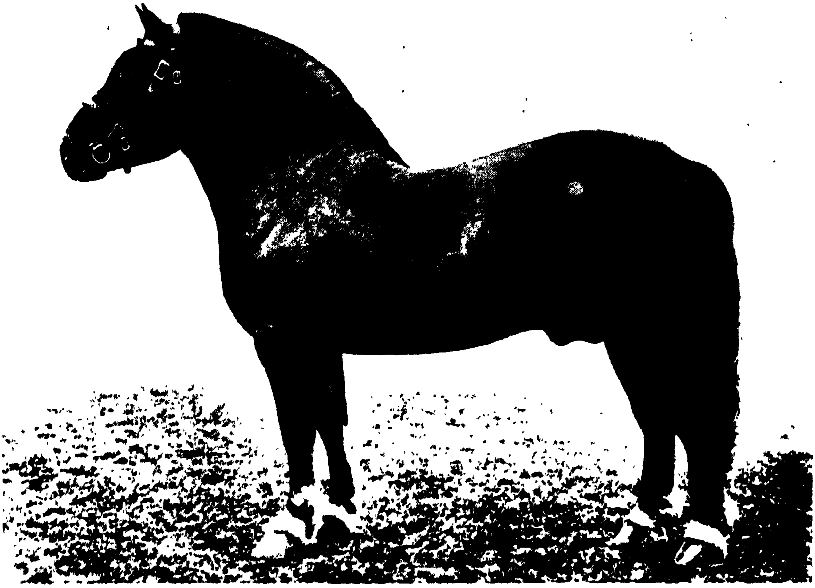
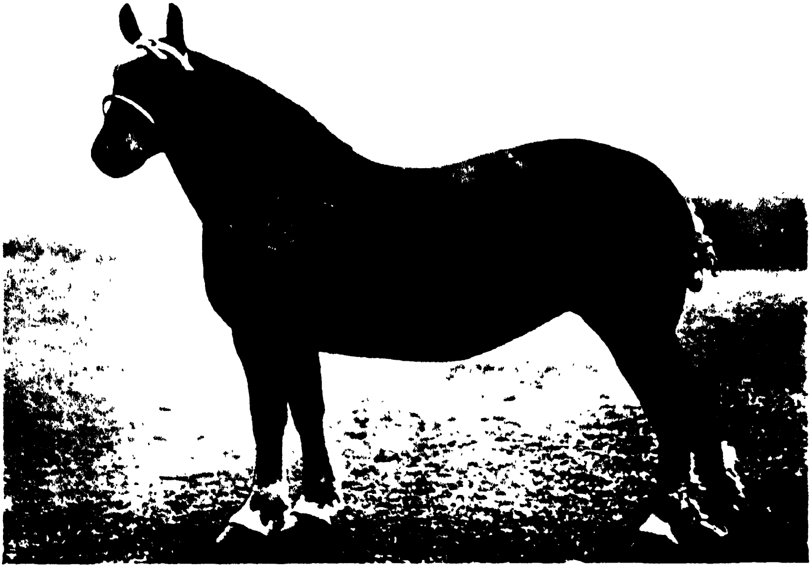


Photo: W. A. Rouch

SUFFOLK : SATURN



For giving small doses (of 2 ounces), a bulb or metal dose-syringe is useful. The tongue is drawn a little way out, as in balling, and as the syringe is emptied over the back of the tongue the latter is released.

Hypodermic Injections.—It is common to clip a small patch of hair off the neck half-way down, about at the middle. The part is dabbed with tincture of iodine. The needle is taken off the syringe, and pressed quickly through a fold of the skin that is gripped and held away from the muscles. Care must be taken not to run the needle into the flesh. It must lie flat on the neck. The syringe containing the dose is slipped on to the needle, and the plunger pushed gently and slowly home. Needle and syringe are withdrawn together.

Tablets used for hypodermic injections are very soluble in cold distilled water.

If a blister forms at the seat of injection, owing to the liquid not being properly absorbed, it should be massaged gently a few times.

Rectal Injections.—Enemas are given to horses a great deal in all cases known as colic, etc. The back bowel (rectum) must be emptied with the hand well greased before the enema is given. The enema should not be colder than the blood temperature. It is generally given warm. An enema pump has a long rubber tube with a wooden nozzle at the end. The hand and nozzle, well greased, are passed into the rectum together; force must not be used. The horse must be taken quietly. The contents of a bucket (3½ gals.) can be pumped slowly in. It is generally required that the enema be kept in for 10 to 15 minutes by depressing the tail. A warm, soapy water enema is commonly used.

Trocar and Cannula.—When the horse becomes badly bloated due to tympanites, the gas may have to be allowed to escape through a cannula. A sterilized trocar is inserted into a cannula, and the two are pressed rapidly through into the large intestine, right down to the head of the cannula; the trocar is then removed quickly, and the gas allowed to escape. For intestinal tympanites, the instrument is inserted, preferably on the off-side, equidistant from the last rib, point of the hip and lumbar process of the spine.

Before the cannula is withdrawn, the trocar should be reinserted. Drugs may be administered through the cannula.

Passing the Catheter.—This is simple with a mare. The hand and arm are cleansed and slightly oiled, and inserted into the vagina; the opening into the bladder (meatus urinarius) can be felt on the floor of the vagina, half-way towards the neck of the womb (uterus). The first finger is inserted, and the greased catheter is passed in under the hand and finger.

In the case of the male, the operation is not easy, and unless done properly is dangerous. Great care must be taken that the catheter is quite flexible, and that it is well greased on the outside. A frozen or perished catheter may break off inside the urethra with serious consequences.

The penis (yard) must be drawn out gently. The catheter is inserted into the urethral opening at the end, and gently slipped in. When the catheter reaches the point where the urethra passes between the buttocks under the tail, it will be easy to feel it; the end must be assisted with the fingers in between the buttocks, in passing round the bend. Before inserting the catheter, the wire supplied with it must be inserted to make sure the tube is open and clean. After use a catheter should be washed in an antiseptic solution.

Poultices.—Unless a poultice is antiseptic it is a grave source of breeding of harmful germs. In modern practice they are replaced a great deal by hot-water baths, and antiphlogistics. Linseed makes the best poultice; about 1 lb., with sufficient boiling water, to which has been added 3 per cent. creolin, to make into a mash. Bran will do as a substitute. Poultices should not be left on more than twelve hours without renewal.

Clay poultices are used for reducing swellings. White clay is mixed with a solution of tincture of iodine, turpentine, and glycerine. This poultice is excellent in some cases of open knee or hock, where the joint is affected. Antiphlogistine is better than the clay, but it is more expensive.

Mustard.—English mustard must be used, and mixed with cold water; never hot water or vinegar, for these destroy the vitality of the mustard To dilute the action, flour must be added. Mix with the fingers or spoon in a basin until of fairly stiff consistency. This paste is plastered on to the chest or other part, fairly thickly (about one-eighth in.), and covered over with sheets of newspaper. Rugs can then be put over the paper. The sensitiveness of the skin, and the condition of the disease will affect the time the mustard is left on. It may be half an hour, or six hours, or until the action ceases (say twenty-four hours). The mustard should not be rubbed in. When the action is sufficient, the mustard can be washed off with a damp sponge, and the horse immediately heavily rugged.

THE HORSE IN SICKNESS

COMMON AILMENTS

Ulceration of the Mouth.—Caused by rough, mouldy or fermented food, strong drugs, etc.

Treatment: Remove the cause. Wash out mouth with solution of permanganate of potash. Laxative diet.

Excessive Slobbering (Ptyalism).—Caused by injuries from bit or strong drugs, foreign bodies in mouth, excess of clover. If wood is wedged in between molars horse may hold head on one side.

Treatment: Remove cause. Change food. Wash out mouth with solution of alum.

Depraved Appetite (Pica).—Caused by deranged stomach, insufficient bulk in food, idleness, too rich food, hot stables. Horse may eat its own dung or chew hair from another's tail.

Treatment: Give purgative, good food and proper exercise, and ventilation.

Sore Throat (Pharyngitis).—Caused by cold, contagion, impure air, smoke, drugs, injuries while balling.

Symptoms: Horse is dull. May be fever. Painful swallowing, and some water may run back out of nostrils while drinking. Throat painful on pressure. May be discharge from nostrils. Dry cough.

Treatment: Fresh air and good loose-box. Bandage legs. Put throat in warm cotton-wool. Give easily-digested bran mashes and hay; spirits of nitre, and ammonia aromatic.

Lampas, or swollen hard-palate on roof of mouth. Caused by ill-health, indigestion, cutting teeth. Shown by horse being off feeding or eating with difficulty. Roof of mouth is sore.

Treatment: Do not burn or cut. Give cooling diet, a mild ball, diuretics and proper exercise.

Acute Indigestion.—Caused by over-eating oats; coarse and indigestible food; too big feed after a fast.

Symptoms: Sudden. In pain, lies down and gets up. May throw himself about. Partial loss of control of limbs. Eructations (belching). Pulse and respirations quick.

Treatment: Give 1 gr. arecolene to clear bowels. Give 1 oz. turpentine in pint raw linseed oil to reduce gases. Give 1 oz. ether and 1 oz. chloral hydrate if horse is much distressed. Careful diet after.

In Foals.—Caused by mare being hot when sucked, or kept away from foal too long.

Treatment: Give chloral hydrate ½ dr., turps. 1 dr., linseed oil 2 oz., for two-weeks-old foal; double this for six-weeks-old. If weak, give wineglass of port wine or whisky in water. Attend to mare's diet.

Chronic Indigestion.—Caused by bad food, irregular feeding, working too soon after feeding, bad stable management, crib-biting, worms, bad teeth.

Symptoms: Pulse slow. Capricious appetite. Thirst. Dung hard, fœtid and covered with mucus. Horse may lick wall and turn his nose up.

Treatment: Examine teeth. Change food. Careful diet. Prepare on bran-mashes and give 8-dr. aloes ball. Afterwards give tonic powders.

Diarrhœa.—Caused by nervousness, bad food or water, new hay or oats, irregular feeding, sudden change of food, worms. If due to worms, coat will be unthrifty, appetite irregular, worms in fæces, diarrhœa persistent.

Treatment: Linseed tea and warm gruel. No cold water. Pint of linseed oil may stop it. A pint of port wine is excellent. If much pain, hot fomentations over belly. Flour and water may do good. Try 1 oz. each of opium tincture and spirits nitre, and ½ oz. camphor as a drench.

Spasmodic Colic.—Caused by sudden change of temperature, or of food, watering after feeding grain, roots, pea straw, nervousess. Is not serious. (*See* Enteritis.)

Symptoms: Sudden. Turns head to side, kicks at abdomen, whisks tail, throws himself about. Intervals of ease follow those of pain. Ears and legs normal. Generally eats hay in between attacks. Fæces will be hard. Pulse up to 80 during attack. Eye bright and clear. Pressure on abdomen pleases horse. Horse takes no trouble to protect abdomen. No eructations.

Treatment: Give spirits Aromatic and Turps, 1 oz. each, in pint linseed oil. Give enema. If pain severe, 1 oz. chloral hydrate in 1 pint water. No drastic purgatives nor Ammon. Carb. Keep horse warm and let lie down quietly. Give ginger in the feed (1 oz.) once a day for some weeks after.

Enteritis (Inflammation of the Bowels).—Caused by feeding grain when hot and tired; chill; eating sand, frozen roots, coarse straw, or mouldy hay.

Symptoms: Somewhat similar to flatulent colic, with following distinctions: pulse and temperature continuously up. Pain not so violent. Evinces pain if side is pressed. Appears afraid to lie down, paws with fore-leg. Eyes dull and bloodshot, limbs and ears cold. Pulse hard and wiry. Shivering. May lie down very carefully. Later he may lie on his back—a bad sign.

Treatment: Give tincture opium 1 oz., camphor 1 dr., repeat every half hour. Warm-water enemas, every hour. Apply very hot blankets to abdomen every ten minutes (the water to be just hot enough to bear the hand in). Tinc. aconite (Fleming) 15 min. every two hours. Give pint port wine, or ½ pint whisky in water. Give warm mash. Later, vegetable tonics.

Flatulent Colic.—May be caused by bad food, fermented food, bad teeth, or sudden change of diet. Is more serious than spasmodic colic.

Symptoms: Somewhat similar to spasmodic. Abdomen becomes larger, due to formation of gas (tympanites). Cold sweat, much pain and anguish. Abdomen is resonant. No eructations. Horse lies down more carefully and pain is more constant than in spasmodic colic. Objects to pressure on abdomen.

Treatment: Act at once. If much bloated, prevent horse throwing himself about. Give 1 oz. turps in 1 pint linseed oil. If much pain give 1 dr. Cannabis Indica. If bladder is full, pass catheter. Give warm enema. If necessary, use trocar and cannula. No Ammon. Carb. (*See* page 273.)

Constipation (Impaction Colic).—Caused by overfeeding, insufficient exercise, food too dry, indigestion.

Symptoms: Uneasiness, looks to side, lies down and gets up. The pain is dull, gets worse; seldom throws himself about. Tries to evacuate. Anxious expression. Pulse and temperature up.

Treatment: Give at once ½ gr. each of arecolene and strychnine, hypodermically; repeat in half-hour if no action. After three doses, if no action, give ½ pint linseed oil every half-hour. Give warm enema, 2 oz. Ammon. Carb.; repeat in 2 hours. No opium or morphine. If pulse weak, Fleming's aconite, 15 min.

Worms.—These may cause colic. The pain will be recurrent and not severe. Will cause indigestion, unthrifty appearance of coat, and possibly anæmia. (*See* page 276.) If obstruction, will cause impaction colic (q.v.). Look for worms in fæces. When badly infested with bots, horse will yawn, the appetite be variable, with emaciation and dark mucous membrane of eye.

Treatment: Bots are the larvæ of the gadfly (*gastrophilus equi*). Expulsion difficult in autumn and winter. Prepare horse for a week with 1 dr. iron sulphate in feed twice a day. Give mashes previous day; no hay at night. In morning give:

Linseed Oil	1½ pints,	or 1 litre
Tinc. Asafœtida	1 oz.,	or 30 c.c.
Ether	2 oz.,	or 60 c.c.
Turpentine	2 oz.,	or 60 c.c.

Give bran-mashes next day. If the bots do not come away, continue with the iron and repeat drench in ten days. An alternative to this drench is 6 dr. (24 c.c.) carbon bisulphide in the oil.

As a preventive, watch for yellow bot eggs on fore-legs and near mouth and other parts, especially on return from pasture. Apply kerosene oil to these twice a day until they die and are rubbed off. These eggs gain access to the stomach through the horse licking them off its leg when irritated by their presence.

Round Worm (*Ascaris*): About 10 in. long, whitish, pointed at each end. Generally inhabits the small intestines. If an occasional worm is found in the dung (always burn it), and health is normal, give 2 to 3 dr. tartar-emetic in morning feed for a week. If the worms are affecting the animal, it shows that they are fairly numerous. In this case prepare the horse as for bots, and give 6 dr. carbon bisulphide in 1½ pints linseed oil, or in gelatine capsule or by stomach tube. CS_2 will burn the mouth severely. This drug is very inflammable and has a most objectionable odour. These worms do not do much harm.

Pin Worms (*Oxyuris*): Whip-like, thin, two to three inches long. Cause much irritation about the dock. Yellow eggs must be looked for near the tail. Give tartar-emetic (*see* Round Worm), and an enema of 1-per-cent. tobacco, or quassia infusion. Inject enema right into floating colon and keep in for fifteen minutes. These inhabit the large intestines and do not do much bodily harm.

Tapeworm (*Tænia*): Uncommon. Comes away in segments. Head is usually left in animal. Withhold food for twenty-four hours, and give 4 oz. turps., 1 oz. male fern in 1 pint linseed. Watch for fine head-end of worm.

Preventive measures: Burn all worms found on the dung. The manure of such horses should not be spread over pastures. Eggs of worms hatch in damp places; dry pastures are therefore safest. Keep horses out of old pastures. Treat suspected pastures with lime and salt, and keep horses off for three months.

Always feed horses plenty of salt. On return from pasture give horse tartar-emetic treatment. (*See* Round Worm.)

Jaundice (Icterus).—Dullness, loss of appetite, droppings hard and bad odour. Coat stary. Urine dark. Mucous membrane of eye and gums, yellow.

Treatment : Get professional help if possible. A strong aloes ball containing calomel should be given in emergency, and careful diet.

Peritonitis.—May follow inflammation of internal organs, or punctured wounds.

Symptoms : Turns head to flank; does not roll. Great pain, hot mouth, pulse up to 80, and wiry, increased respirations, temperature up. No peristalsis. Tender abdomen. Anus relaxed.

Treatment : Tinc. opium and spirits of nitre, of each 2 oz. Warm enema. Hot-water blankets over abdomen.

Inflammation of Kidney (Nephritis).—Caused by chill, abuse of nitre, turpentine, etc., mouldy food; blow or fall.

Symptoms : Points nose at kidneys. Frequent attempts to urinate, which is scanty and thick. Rolls gently, may moan. Mouth and nostrils hot. Bladder empty. Temperature and pulse up. Heat around kidneys if examined per rectum.

Treatment : Examine per rectum. Hot applications to loins. Hot-water enema. Oil purgatives. Careful diet.

Retention of Urine.—Caused by paralysis, injury to penis, or may follow colic.

Symptoms : Violent attempts to urinate. Bladder will be full. Pain.

Treatment : Examine bladder per rectum. Pass catheter. Warm-water enema. Give nux vomica and belladonna, of each 1 dr.

Diabetes Insipidus (Polyurea).—Caused by bad stable management, dusty or fermented foods.

Symptoms : Excessive thirst and urinating. Weakness. Indigestion. Temperature not up. Pulse up. Coat harsh.

Treatment : Do not give too much water; mix clay in it. Mild purgative. Good food. Give potassium iodide, 2 dr. a day, in water.

Azoturia.—Caused by keeping horse in the stable for a day or more on rich diet and then working hard. Common in heavy horses. Bad ventilation and hygiene predisposes horse.

Symptoms : Horse goes well, then becomes dull, goes slower, and stiffens over loins. May drag hind-legs. Sweats profusely; great pain; may tremble and fall. Muscles over loins and hindquarters very hard. Breathing difficult. Great nervousness. Urine colour of tar (colouring-matter from muscles). Pulse quick, jerky and hard. Temperature may reach 104° F. Legs and ears cold.

Treatment: Apply hot-water blankets over hind-quarters. Give arecolene 1 gr., and also aloes ball. Give plenty of water. 1 oz. of each spirits of nitre and aromatic. Pass catheter every four hours. Warm enema. If down, make comfortable. When a horse has been left in for some days and fed too much grain, this disease can be prevented by giving the horse half-an-hour's walk, and putting him back in the stable for an hour, and then giving him the regular work.

Clot in Artery (Thrombosis).—Generally in the femoral artery, near the bladder.

Symptoms: Sudden and severe lameness behind. Muscles on top not hard. Limb deathly cold. Severe pain.

Treatment: Hot fomentations over part. Give 20 min. Fleming's tinc. aconite, and chloral hydrate 1 oz. May recover suddenly. Give tonics after, and rest.

Lymphangitis (called "Monday-Morning Ill").—Caused by overfeeding grain on day of rest.

Symptoms: Swelling in one or both hind-legs. Shivering, lameness, later fever. Pulse up to 90, full and strong; temperature up to 105° F.

Treatment: Hot fomentations to the legs. Arecolene ½ gr. every half-hour until passage. Spirits of nitre and aromatic, of each 1 oz. Careful diet and regular exercise afterwards.

Rheumatism.—Caused by cold, damp, rapid cooling when sweating. Hereditary predisposition.

Symptoms: Sudden stiffness. Muscles may be swollen and painful. Joints crack on movement. If much pain, pulse will be up, may be sweating. May suddenly move to another set of muscles. Difficulty in rising.

Treatment: Give soda salicylate, ½ oz. twice a day; mild aloes ball, and ½ oz. nitre once only. Good food and stabling. Avoid draughts. Massage muscles when soreness has gone.

Articular Rheumatism.—Temperature up to 106° F. Joint swollen, hot and painful. Pulse up to 80.

Treatment: Soda salicylate up to 5 oz. a day. Hot fomentations and antiphlogistics. Massage later. May be necessary to blister joint.

Ophthalmia.—Caused by a blow, hay seeds, chaff, etc.

Symptoms: Eye swollen, full of tears and partially closed.

Treatment: Look for foreign body with magnifying-glass. Use cocaine. (*See* page 267.) Bathe with warm solution of boracic acid. Keep bowels open. Keep eye away from bright light; cover if necessary.

Periodic ophthalmia may follow the above, or be caused by exposure to snowstorms or sun's rays, or be due to constitutional disturbance. The symptoms come on suddenly, eye is retracted, pupil contracted. Eye inflamed, and sensitive to touch. Sight gets worse at each attack.

Treatment: Good food and hygiene. Treat as for ophthalmia. Inject 2-c.c. Lugol solution in lid under eye.

SKIN DISEASES: NON-CONTAGIOUS

Hidebound.—Horse's coat and skin is firm and immovable, instead of being loose. It shows bad health, generally the result of bad stable management, bad feeding, and lack of exercise.

Eczema, or inflammation of true skin, or dermis (summer itch).

Erythema, or inflammation of the outer skin, or epidermis.

Cause: Harness chafing. Exposure to wet, extreme heat or cold. Dirt, bad feeding, dirty clothing, constitutional disturbance. Indigestion.

Symptoms: Small nodules; hairs on these are erect. Scabs form and leave bare patches. Itching.

Treatment: Apply glycerine; later wash with castile soap and tepid water. Bathe with Dick's lotion (1 oz. each of lead acetate and zinc sulphate to a quart of water). Change food; shelter from heat, sun or cold. Give a ball, and sodium hyposulphite ½ oz. twice a day. If bad, give Fowler's solution of arsenic, 1 oz. a day for a week; sulphur, 2 oz. in feed at nights. Keep flies away, and everything sanitary. Feed no maize, and very little oats; good timothy hay and bran. Lots of salt and water. Groom well.

In eczema of the tail, prevent rubbing of tail; try 5-per-cent. solution of dilute hydrocyanic acid; or 6-per-cent. solution of silver nitrate. Do not clip. (*See* page 202.)

Mud Fever is eczema of legs and abdomen, due to neglect, or over-washing. On return from work, when dry, brush legs, etc., clean. Treat as above, or use saturated solution of picric acid.

Grease (Cracked heels, scratches).—On back of pasterns and bulbs of heels. Mallenders, behind knees. Sallenders, in front of hocks. Are all forms of eczema.

Cause: Dirt, exposure to damp, snow, cold. Wet legs in a draught, constitutional disturbance.

Symptoms: Skin red, blisters form, skin cracks, hairs fall out; watery discharge.

Treatment: Cleanliness. Wash well with castile soap. Dry without rubbing. Rub in Dick's lotion; saturated solution of picric acid. Apply light dressing to keep part clean. Give mild ball, and careful diet. Sufficient exercise.

Trimming or clipping heels does not appear to predispose a horse to grease. On return from work, rub the mud off lightly with straw, but do not dry. Brush well when dry, with horse's weight on the leg, i.e. when the skin at back of pastern is not wrinkled.

Warts.—An epidermal growth; may be caused by ill-health or neglect. Remove with caustics, such as nitric acid, or caustic potash.

PARASITIC SKIN DISEASES

Mange (Scabies, Itch).—Caused by a mite, the size of a pin's head. Only three kinds affect the horse: Sarcoptic, Psoroptic, and Chorioptic. Size: $\frac{1}{100}$ to $\frac{1}{50}$ inch.

Symptoms: Itching. Animal likes parts to be scratched. Parts become thick, hard, wrinkled, devoid of hair, and perhaps sore. Takes some weeks to develop. Diagnose by examining scraping under microscope.

Treatment: Isolate. Clip the part; burn the hair. Wash well with castile soap. Burn old bedding. Disinfect clothing and head-collar with strong solution of creolin, and leave for some days in the air; treat grooming kit likewise. Disinfect stall. Do not clip horse if it cannot be kept in warm stable, as it will be too severe on the system. Quickest treatment to kill the mite is the calcium sulphide warm dipping-bath.

Or apply:	Sulphur	2 oz., or 60 gm.
	Oil of Tar . . .	2 oz., or 60 c.c.
	Oil of Linseed . . .	1 pint, or 600 c.c.

Heat for one hour in hot water, and shake together.

Rub well in with a water-brush for two days in succession.

Lice.—Found on neglected horses. Insect is $\frac{1}{10}$ in. long. Great itching on affected parts, chiefly at roots of tail and mane; hair stands up, and little casts of skin.

Treatment: Apply 3-per-cent. solution creolin or *tobacco.* Repeat in ten days and twenty days, as there will be eggs left there. It is safer to wash only half the horse at once, making sure the two washes overlap. One half should be quite dry before beginning the other. This reduces the danger of poisoning the horse, which is liable to happen if his whole body is covered in a toxic solution for many minutes.

Ringworm.—Caused by a fungus (*tinea tousurans*). Contagious. A blanket may remain infectious for months if not disinfected.

Symptoms: Generally no inflammation and no itching. Spreads in circular patches, leaving bald places. The fungus eventually dies, and hair returns. The rings reach from 1 to 2 inches in size.

A form of eczema (non-contagious ringworm) exists, in which there is itching and the rings grow larger.

Treatment: Isolate. Disinfect clothing, tools, harness and stall, as for mange. Wash horse all over with calcium sulphide solution (made from lime and sulphur) and repeat in three days. No need to clip. If localized, apply solution of turpentine and tinc. iodine (equal parts) for three days, well over the affected area.

OTHER AILMENTS

Cough or Cold.—Caused by chills, neglect, bad health, contagion.

Symptoms: Cough, nasal discharge, fever, dullness, coat unthrifty. Sore throat (q.v.).

Treatment: Bran-mashes and linseed. Fresh air and good hygiene. Careful diet; ½ oz. nitre. Lots of cold water. Inhalations from bucket of boiling water, to which has been added 6 oz. turps. Give electuary:

Pot. Chlorate	½ dr., or	2 gm.
Camphor	½ dr., or	2 gm.
Pot. Nitrate (nitre) . . .	½ dr., or	2 gm.
Treacle	6 oz., or	180 gm.

Put a little on the tongue every two hours.

Roaring (Whistling).—Partial paralysis of the larynx, preventing the epiglottis from opening properly, as horse inhales. Caused by severe fast work when too young. Narrow throat predisposes.

Injuries. The noise on inhaling at canter cannot be mistaken. Whistling is a mild form of roaring.

Treatment: Good food and careful exercise. Strychnine and potassium iodide may help. Successful operations have been performed.

Broken Wind (Emphysema, Heaves, Chronic Asthma).—Caused by bad horsemanship. Hard work on full stomach, or when in bad condition. Feeding dusty or bad hay or oats.

Symptoms: Wheezy, distressed exhaling, dilatation of nostrils. The exhalation will be prolonged. Double action of abdominal muscles after inhalation. Breathing worse after a meal. Weak, suppressed cough.

Treatment: No real cure. Green feed, mashes. Wet all hay with brine or lime-water. Linseed tea. Good hygiene. Easy, slow work. Fowler's solution arsenic, 1 oz. a day for alternate weeks. Give lobelia and nux vomica powder, of each 1 dr. in feed, morning and night. Sending the horse to a high, dry climate (such as that of Alberta) generally effects a temporary cure.

Pneumonia (Inflammation of Lungs).—Caused by a streptococcus. Chill, fast work in severe cold, long exposure, over-exertion, bad ventilation.

Symptoms: Dullness, shivering, high temperature, quick pulse, respirations up to 50. No pain unless there is pleurisy (when crackling can be heard in chest). Abdominal breathing, nostrils distended, eyes red; strong cough. Urine scanty and high-coloured. Horse generally stands, fore-legs stretched out. Well-marked, thickened sound in lungs.

Treatment: Fresh air is essential; large loose-box with window or top half of door open. No draughts. Take chill off water; give plenty. Massage legs and bandage. Rug well. No purgatives. Soap enema. Feed carrots, linseed tea, and mashes. If pulse bad, Fleming's tinc. aconite, 10 min. twice a day. Spirits of nitre and aromatic, each 1 oz. in water. Plaster whole chest with mustard. (*See* page 274.)

Give vegetable tonics, as chiretta, gentian, etc., later.

Influenza (Pink Eye).—Caused by contagion (*streptococcus*).

Symptoms: Temperature to 106° F. Coat staring, pulse quick, eyelids swollen, pinkish colour to eye. Joints swollen. Difficult defæcation.

Treatment: Bathe eyes with solution boracic acid. If pulse weak, give digitalis tinc. 4 dr. An excellent drench is:

Ammonium Chloride . . .	½ dr., or 2 gm.
Pot. Bichromate . . .	5 gr., or ⅓ gm.
Water, sufficient.	

Three times a day.

In bad cases give pint of whisky in water. Vaccines should be used (*streptococci equi* and *staphylococci*); give diet and comfort as for pneumonia.

Strangles.—Constitutional contagious disease, peculiar to young horses. (Caused by *streptococcus coryzæ*.)

Symptoms: Like a cold at first. Later, swelling and abscess under jaw, and perhaps on other parts of body. The fluid from any swelling is infectious. The abscesses tend to point (different from glanders).

Treatment: Hygiene, diet, fresh air. Keep warm. Inhalation of steam as in cough.

Foment abscess. Lance when ready if necessary. No purgative. Mashes and enema. Vaccines. Careful exercise, diet, and tonics after.

Glanders.—Very contagious (caused by *bacillus mallei*).

Cause: Indirectly: unclean utensils, contagion.

Symptoms: Off feed. Watery discharge from nose, which becomes thick and dark. Abscesses form on lower jaw, which do not point. Later, pimples on Schneiderian membrane (in nostrils). Nasal discharge is very infectious and has bad odour.

Treatment: Isolate, report at once, and take all precautionary measures. Can be transmitted to man.

Staggers (Epilepsy) or Sunstroke.—*Cause:* Tight collar, exposure to sun or great heat. Overworking in heat. Engorged stomach. Insufficient water.

Symptoms: Horse staggers suddenly. Quickened breathing. Later, falls and is unconscious (distinguishes from azoturia).

Treatment: Remove collar and headgear. Apply cold water or ice to head. Keep bowels open with quart of linseed. Give hypodermically, if unconscious, ½ gr. arecolene, and 3 gr. caffein. When consciousness returns, give ½ pint whisky in water, or 4 oz. aromatic spirits of ammonia. Keep horse quiet.

Tetanus (Lockjaw).—Caused by the toxin produced by bacteria (tetanus bacillus) in a neglected wound. These germs are present almost anywhere; therefore wounds should always be treated antiseptically, and as an extra precaution the anti-tetanus serum should be used. In the case of a wound that, when first treated, is several hours old, a full dose of the serum should be injected without delay. This refers, chiefly, to wounds that have been in contact with the soil, particularly clay. Punctured wounds are the most serious. Certain districts are known to be particularly dangerous in this respect.

Symptoms: Similar to strychnine poisoning. Gradual contraction of muscles of expression; later, of neck, back, and tail. Eyeballs drawn back in socket. Horse is outstretched and looks terrified. Quick respiration. Highly nervous.

Treatment: Keep very quiet, and in dark stall, away from the least excitement. Treat wound, and get veterinary assistance at once. The serum should be injected immediately. Do not try to drench the horse.

Stringhalt.—An involuntary elevation of one or both hind-legs while in motion. Is a nervous affection.

Good feeding and electricity may do good. An operation on the peroneus tendon over the hock joint is often successful.

Blood-poisoning (Septicæmia, Pyæmia and Sapræmia).

Symptoms: High temperature; depression and debility; swellings. Generally follows wound or abscess.

Treatment: Attend to wound. (*See* page 260.) Nutritious diet, pure air; stimulants, as whisky. 1 oz. nitre, plenty of salt and cold water. Give 1 dr. soda-hyposulphite every half-hour in water with mouth-syringe, until the temperature drops.

Metritis (Inflammation of Womb).—Follows parturition; due to neglect and lack of aseptic precautions.

Symptoms: Temperature 105° F. or higher. Loss of appetite, shivering and sweating, great distress, rapid respirations, straddling gait.

Treatment: Mild purgative. Give drench of Fleming's tinc. aconite 15 min., camphor 1 dr., opium 1 dr., chloroform 1 dr. in water. Wash out womb (uterus) with 1 to 1,000 warm mercury perchloride solution, followed with a 1 per cent. warm solution of salt (sodium chloride). Hot fomentations of loins. Keep quiet. Good diet of mashes and linseed tea. Keep away from sexual excitement.

CHAPTER XII

BREEDING—CARE OF MARE AND FOAL—AGE AND TEETH

THIS subject has been dealt with in detail in "Conformation and Appointments of the Horse."

The science of horse-breeding requires the most careful study on the part of those who send a mare to the stallion with the hope of getting an offspring that will be worth raising. The number of misfits still produced demonstrates clearly how necessary it is to study this subject scientifically.

Never breed from a mare of bad conformation or that is unsound. Lameness produced by an accident—and that does not result from bad conformation—should not debar.

The stallion generally gives the conformation; the mare, the constitution. We should breed for type and character.

The value of the race-course to the breeding industry cannot be disputed by anyone who has studied breeding, and the history of the light horse. Horse-shows, being dependent so much on the fancies of the judges, have comparatively less influence on progress in breeding.

The following unsoundnesses should debar a mare or stallion from being bred: ringbone, sidebone, spavin, navicular disease, stringhalt, shivering, cataract, roaring, broken wind, and defective genital organs.

Duration of Pregnancy in Mare (Utero-gestation).—335–345 days (11 to 11½ months). A foal may live if born 10 months after conception. Duration is less in old and poorly-fed mares. The day of conception (fecundation) cannot be decided, because the male seed (spermatozoon) may not impregnate the female ovum for several days after copulation.

It is quite common for a mare to be up to 10 days over-due; she may go three or more weeks.

Table of Œstrum for Mare:

Duration, 4 to 7 days.
Return, if not impregnated, 2 to 3 weeks.
Return after parturition, 7 to 10 days.

Reproduction Period.—The reproduction period of a mare generally lasts as long as the mare. It is not uncommon for mares to foal at 25; and records show one foaling at 35 years.

The best time to breed the mare is in April or early May. Late foals are stronger and sound in the wind.

The Care of the In-foal Mare is of great importance. She must be given plenty of light exercise all the time. She should never be ridden, or driven between shafts if there is any possibility of the shafts banging her sides; nor should she ever be backed up suddenly. Light pair draught work is the best. The light breeds should get trotting. The best way to exercise a hunter or saddle-mare is to lead it or drive it as lead in a tandem. Two hours' walking and trotting a day is necessary, except on Sundays. There should be no straining. But idleness will never produce a good foal. The diet must be good, for it must be remembered that the foal has to be fed as well.

Care must be taken that the mare does not slip or fall. Strong purgatives must never be given. Give boiled oats and mashes at night, often.

The exercise should be kept up until the day of foaling. Mares at pasture in mild climates will generally exercise themselves. But it must be remembered that the fat, soft state that a mare develops at pasture is responsible for many barren mares.

It never hurts to let an in-foal mare roll. She will be careful without any advice from man.

During the last week a hot feed should be given every night. Watch the droppings; and change diet, if necessary. Plenty of roots and grazing.

Ice-cold water is better not given during the last two months.

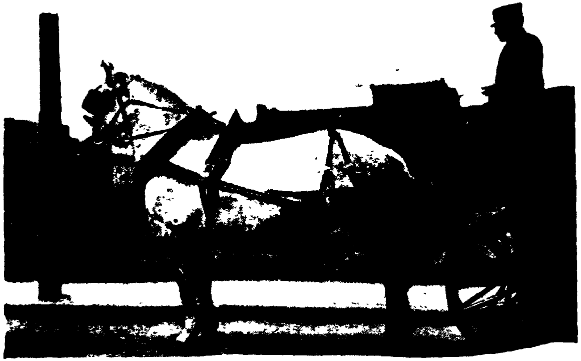
To lessen the risk of navel or joint ill in the foal, give the mare, for six months before foaling, 2 dr. (8 gm.) potassium iodide in the water, twice a week.

Signs of Pregnancy.—At times it is impossible with young mares, or with old ones either, to be certain that they are in foal. As a rule there will be a distinct change in the temperament and susceptibilities of the mare.

Generally, œstrum will cease, and the mare will refuse the stallion; but this is no proof, because she may take the horse after she is in foal, but this very rarely occurs. Mares in season may refuse the stallion when they are not in foal.

The in-foal mare is generally quiet, careful in her movements,

PERCHERON: FRANK J.



PERCHERON GRADE HORSE

PAIR OF PERCHERONS

DAPPLED GREY PERCHERON

and even lazy. She may put on flesh. The change in the size of the abdomen varies greatly; some show a marked change early, others vary slightly up to within a few weeks of foaling.

Reliable information may usually be obtained by rectal or vaginal exploration. This must not be done by a novice, as there is much risk, especially in the latter, unless great care is taken.

Foaling Signs.—A careful watch should be maintained for signs. The udder will fill and wax will form on the teats. Milk may run for a couple of days before parturition. Watch for slackening of the hips and vulva.

The uterus will drop and the fœtus come back some days before foaling.

For several weeks the foal can be heard kicking, especially when the mare drinks. Accustom the mare to being handled around the udder; this will save trouble later.

The mare will show labour-pains; uneasiness, excitement, nervousness. She may lie down, get up, and strain. She may seek solitude. This may be followed by a period of ease, and another attack. These attacks become more pronounced and more prolonged.

On the other hand, she may have labour-pains, like colic, a week or more before parturition, which may pass off entirely.

Have a clean, airy, light loose-box, that has been thoroughly disinfected, well bedded down.

The mare should be visited frequently, without being disturbed. Although the majority of mares foal without incident, lack of precautions may be disastrous.

Birth of the Foal.—When the straining becomes pronounced the foal should make its appearance.

If, after the fœtus has made its appearance, the mare continues to strain, and the foal does not come out easily, it will be necessary to give assistance. Gently grab the legs, which will be protruding, and pull, as the mare strains, backwards and towards the mare's hocks.

As soon as the foal is born, free its nostrils of the membrane (placenta), and allow it to breathe the air. The umbilical cord will soon cease to pulsate, because the heart and lungs of the newborn foal will be functioning, and the maternal circulation will soon cease. The cord will then be quite thin, and may break as the foal struggles to get up. The foal should be laid on its right side.

Avoid all fuss and noise.

If the mare is too weak to lick the foal dry and warm, this must be done with towels or cloths.

Should the foal appear to lose consciousness, cold water should be sprinkled on its head, its sides slapped, and ammonia fumes blown into its nostrils.

It may be necessary now to break the cord; this should be done an inch or so from the navel, and the end bathed in tincture of iodine. Then clean the four hoofs, and bathe the under-parts and heels thoroughly with the iodine to prevent infection getting in between the cartilages that have not as yet united. It may be necessary to ligature the cord.

Do not attempt to pull the after-birth (placenta) away from the mare. Tear off any portion that is on the ground.

In normal presentation the fore-feet and head will lie on the floor of the passage, pointing backwards (outwards). The fore-feet will protrude beyond the nose. A foal may be presented reversed.

If neither of these is the case, then every effort should be made as quickly as possible to secure one. Professional assistance should be sought at once. If the head is bent back, it will be necessary, while the mare is not straining, to push the fœtus in first. Straining may have to be prevented by the use of chloroform. Time is of the utmost importance. Avoid causing the mare further excitement.

Care after Birth.—Normal labours require no surgical treatment. Give the mare a hot gruel, and in half an hour a small bran-mash.

The foal should get up in half an hour, and go to the maternal font. It may be necessary to assist it. If this is not the case, and the foal becomes on good terms with the dam, they should be left alone for a few hours.

If the placenta has not cleared away in 12 hours, it should be gently removed, after injecting two quarts of a weak antiseptic, and thoroughly cleansing the hand. Then the womb should be flushed out with a 1-per-cent. saline solution.

If the foal has no passage in a few hours, inject a little soap and water (castile). Next day the rectum should be again injected and cleaned out. The rectal area should be washed. Watch the urinating of mare and foal.

The first milk of the dam (colustrum) must be given to the foal, it contains Nature's immunity against disease. If the foal cannot stand at first, it will be necessary to draw off some milk into a bottle, and to feed the foal through a rubber nipple.

The foal must have enough to eat from the very first.

Plenty of oats and good hay for the mare, and hot boiled oats every night. Get the foal from the first to nibble at any of its mother's feed.

Let the foal have all the crushed oats it will eat; protect these from the mare, or else she will take them. Be careful that the foal cannot get its legs caught in any holes or racks, etc.

Luscious grass for the mare is necessary to produce good and sufficient milk. Give the foal salt and bone meal. (*See* page 292.)

If the milk is insufficient, which will be shown by the foal continually sucking, but coming away unsatisfied, give cow's milk, to every pint of which is added a tablespoon of sugar dissolved in a little warm water, and four tablespoons of lime-water. Warm to blood heat and give a quarter-pint every hour for the first few days.

Avoid giving the foal medicines. An enema may be given, if necessary. If there is diarrhœa, an egg beaten up in a tablespoon of brandy, and a few ounces of the dam's milk, can be used as a drench. Rectal injection of flour-gruel and tincture of opium may do good. If constipated, give 4 oz. linseed oil and a warm soapy enema. Have all sanitary precautions taken.

Get the foal used to being handled all over and led on a halter. Never leave it tied up unattended.

If the mare has to work, the foal must not run by her side if such exercise is too severe; if the foal is shut up it may injure itself. A foal should never be allowed to suck while the mare is hot.

Normally, the mare's milk has a higher percentage of water than most other milk. Lack of sufficient grain and hay, and feeding off damp pasture (especially clay) increases the water, which is not desirable. This will also cause decrease in sugar, fat, casein and phosphates; the latter sufficiently to affect the skeletal tissue of the foal.

It is a good plan to wash the udder of the mare with a warm 2-per-cent. solution of creolin or lysol before the foal has its first suck, and to rinse it off with warm water.

Mare and foal should never be kept in a hot stable; such will cause chills very easily. Watch that the foal does not become heated in frolicking about and then get chilled off; pneumonia is often brought on in this way.

A small paddock or yard for the mare and foal to run about in, for several hours each day, is most necessary.

As has been before stated, limestone is unquestionably the best soil on which to raise horses. The districts famous for small breeds and ponies are invariably deficient in lime.

In the absence of the natural lime, phosphate of lime should be fed to the foal. This can be obtained in the pure state, or more cheaply as bone- and other kinds of meal. Such meal must be procured from reliable firms only, because it is essential that it must have been sterilized in preparation to prevent risk of carrying disease. Fish-meal, therefore, is safer, because with it there is no such danger. From 5 to 10 per cent. of the weight of grain fed the colt should be the amount of meal fed daily; well mixed with the grain.

Commercial animal charcoal contains a high percentage of phosphate.

Care of the Weanling.—The foal should not be weaned until it is six months old. If it is weak, and the mare is not in foal, it is better not to wean it for two or three more months. It is a good plan to teach a foal to drink milk from a pail, as this may be invaluable in case of sickness.

Plenty of good oats (crushed, for the first few months), bran and timothy hay, with a little alfalfa (lucerne), form the best diet. A hot feed (boiled oats and bran) should be given every night. Crushed oil cake is excellent. There must be plenty of clean, fresh water, and a lump of rock-salt. Bone-meal or calcium phosphate is added to the grain. Two to 4 lb. oats, and 1 lb. bran daily are necessary for a six-months-old foal. If there is no bran available for a meal, add chaff to the grain.

A sod of earth is a good thing to allow the foal to chew.

Great care must be taken to prevent the foal injuring itself when first taken from its mother. It should be put with another foal, if possible. Everything should be done to stop it fretting. Do not keep it where it can hear its mother's neighing; this will only make it worse.

The mare's milk should dry up in a few days; it is seldom necessary to run any off. Watch the udder.

The hoofs should be trimmed once a month or so, and the correct slope of the foot obtained. Never cut the bars, sole or frog.

Pick the feet out carefully every morning, and whenever the foal comes into the stable. Neglect in trimming the feet is responsible for much lameness in after life. (*See* page 235.)

A rug should be provided. When a year old the colt should weigh one-half its matured weight.

The colt must have a nice, roomy loose-box.

Watch for any signs of lice. Two or three applications of raw linseed oil, rubbed in, should exterminate these. The foal should be kept out of the strong sun for twelve hours after an application.

Attention to the Teeth.—An occasional examination of the foal's mouth should be made. Knowledge of a normal mouth is necessary, in order to be sure of detecting abnormalities. Veterinary assistance should be secured if there is any doubt.

When the young horse reaches three or four months, he may require attention to his teeth. Cutting teeth will mean a sore mouth, and the horse may go off his feed for a while. Bran-mashes may be necessary for some days. Watch the teeth and examine them whenever the horse appears abnormal. Do not, however, worry him by continually looking at them. A speculum is quite unnecessary in this examination.

AGE AND THE TEETH

A horse's teeth should be examined by one qualified to do so at least once a year, and whenever he goes off his feed, pulls suddenly at the bit, carries his head crooked, appears one-sided in the mouth, is irritable, slobbers unduly or has a sore tongue. A horse over six years of age probably requires his teeth floating once a year. This consists in taking off the sharp points on the inner edge of the lower, and the outer edge of the upper molars. The upper molars are wider apart than the lower, and when the teeth are closed they do not entirely cover one another. The table surfaces are naturally roughened like the grinding-rollers of a mill. These, of course, must not be rasped smooth. The plane of the table is not horizontal, but inclines inwards and upwards. Big projections into the gums or tongue may have to be clipped off.

There may be a piece of wood wedged in between the molars, and this may be difficult to discover.

Neglected teeth cause indigestion, and considerable wastage of food and money.

How to Examine Teeth.—A speculum is not necessary to examine teeth, but is necessary for floating. Care must be taken that it is resting properly on both rows of incisors, and that it is secured and not open too wide.

When not using the speculum, the right hand and arm are inserted into the mouth, and the tongue kept with the back of the hand in between the left (near-side) molar teeth. This prevents the horse closing his mouth on to the fingers, while they carefully feel the off-side molar teeth of both jaws. The left hand is then used to examine the near-side molars, by keeping the tongue between the off-side molars.

The tooth consists of a crown with a table on top (grinding surface), a neck, fangs and root. The horse has two sets of teeth; temporary or milk, and permanent. The front teeth are incisors or nippers; the back are molars or grinders; the canines are called tushes.

The full number is:

Temporary :	Incisors, six on each jaw .	12
	Canines	0
	Molars, three on each side of each jaw	12
		24
Permanent:	Incisors, six on each jaw	12
	Canines, one on each side of each jaw	4
	Molars, six on each side of each jaw	24
		40

Generally the mare has no canines, and has, therefore, 36 teeth.

The tooth is composed of dentine, surrounded by a very hard enamel.

Inside the tooth is a pulp cavity that extends part-way down the tooth. This forms the star on the table. There is also a cup in the table, which wears out as the horse ages. The star is exterior to the cup. There is a yellow material, called crusta petrosa, on the sides of the teeth, which continues to grow after the tooth has formed.

Permanent incisors have no well-marked neck (as the milk incisors have), are larger, longer, not so white, are a bluish tint, and are more curved on the outside face.

The angle of incidence, formed by the incisors when closed on one another, decreases as the horse ages. At 2 years it is nearly 180°; at 8 it is about 120°; at 16 about 90°; at 24 about 60°. The incisors get longer, straighter and thinner as the horse ages.

The centre incisors are called centre or middle. The next intermediate or lateral. The outside ones, corner.

Average period of eruption.

Temp. Incisor	*Eruption*	*Shedding*
Mid	Birth to 8 days	2 to 2½ years
Inter.	4 to 8 weeks	3 to 3½ „
Cor.	6 to 8 months	4 to 4½ „

Permanent	*Eruption*
Mid.	2 to 2½ years
Inter.	3 to 3½ „
Cor.	4 to 4½ „

These teeth will be up level six months later. All will be up level at 5 years.

Canines (perm. only) erupt at 4 to 4½ years, or a little later.

Temp. Molars	*Eruption*	*Shedding*
1st	at birth	2½ to 3 years
2nd	at birth	2½ to 3 „
3rd	birth to 1 month	3½ to 4 „

Permanent	*Eruption*
1st	2½ to 3 years
2nd	2½ to 3 „
3rd	3½ to 4 „
4th	10 months (1st perm. molar)
5th	1½ to 2 years
6th	3½ to 4 „

Grain will cause the molars to be more advanced; grazing on sandy soil will advance the incisors. Thoroughbred race-horses often have their teeth advanced six months.

The cups in the upper incisors are deeper, and disappear about four years later than the lower.

Teeth are fully matured at nine generally, and from that age grow out from the jaw-bone.

As the table of the incisor wears away, it varies very much in shape and appearance. At first there is only the cup at the back of the tooth, then the cup disappears, and later the star appears.

The shape at five is rectangular, with width double the depth; at ten it is almost square; at fifteen it is triangular (equilateral); at twenty it is an isosceles triangle, with depth one-and-a-half times the width; at twenty-four it is rectangular, with depth one-and-a-half times width. The canines begin to wear flat on top at any age after eight years.

Dishonest dealers falsify the age by rasping the teeth of young horses, and by making false cups in those of old ones. The shape of the teeth, though, will not deceive anyone who has studied the matter.

The lower molars usually precede the upper in erupting.

The mouth from birth to five years.

t = temporary; p = permanent.

Birth or soon after; t. mid. incis., 1st and 2nd t. molars.
3 months; t. mid. incis., t. inter. incis., 1st, 2nd, 3rd t. molars
9 months; all t. incis., 1st, 2nd, 3rd t. molars.
1 year; all t. incis., 1st, 2nd, 3rd t. molars, 4th p. molars.
2 years; all t. incis., all t. molars, 4th, 5th p. molars.
3 years; p. mid., t. inter. and cor. incis., 1st, 2nd, 4th, 5th p molars, 3rd t. molars.
4 years; p. mid. and inter., t. cor. incis., all p. molars.
5 years ; full mouth.

After 5 years we tell the age by examining the tables (cups), the shape of the teeth, and the angle of incidence of the incisors.

The Cups	*Disappear*
at 6 years	lower middles
at 7 years	lower intermediates
at 8 years	lower corners
at 9 years	the rear corners of upper corner incisors grow down
at 10 years	upper middles
at 11 years	upper intermediates
at 12 years	upper corners

The star appears on the lower incisors, towards the outer edge:

at 9 years	middles
at 10 years	intermediates
at 11 years	corners

After a horse reaches twelve years of age considerable practice is required to tell its age; but with experience, it is easy to judge this up to twenty fairly accurately.

At fifteen years the sharp point at the rear of the upper corner incisors has worn off.

A horse "rising-six" is nearly six; one "six-off" is past six, but not over six and a half.

Wolf Teeth appear occasionally in the jaw alongside or behind the incisors. Generally they should be extracted, as they cause irritation and serve no useful purpose.

Aged Horses.—Six of Desmond's male ancestors lived to be 27. St. Serf lived to 28; his sire, St. Simon, to 27, and his sire, Galopin, to 27. Gallinule, to 28. Competitor (son of Eclipse), 30. Thunderbolt, Bay Bolton and Diamid, 31. Matchless and Sampson, 32.

A stallion in the Argentine died at 47; he had lost all his teeth and had been fed on mashes for some years.

A Standardbred, Clover, born in 1872, was still able to take a buggy 10 miles in 1922 (50 years old). At six he trotted a mile in 2 min. 22 sec. At 50 he was able to eat grain and was full of life.

Old Billy, worked near Manchester and died in 1822 at 62 years of age. *The Sportsman* guaranteed the age as authentic.

Barney, 45 years old in 1930. Mr. Whiting, Newport Pagnall, Bucks. Had many foals; one by a T.B. that sold for £800.

A Pinto pony aged 53 years was destroyed in Toronto in Dec. 1931.

An Australian draught mare aged 46 years was sold fat in 1936. Had had 34 foals; two only died as foals. Ceased to breed after 1932. Teeth quite sound.

CHAPTER XIII

PHARMACOPŒIA AND GLOSSARY

CONDENSED **Pharmacopœia.** *Dosage.*—If the dose for a horse four years old, or over, of 1,000 lb. matured weight, is 1, that for under 4 is:

3 years	¾
1½ to 3 ,,	½
9 m. to 1½ ,,	¼
4½ to 9 months	⅛
1 to 4½ ,,	1/16
2 to 4 weeks	1/30
Birth to 2 ,,	1/60 (or that for a man)

A 5-per-cent. solution of creolin means that there are 5 units by weight in every 100 units of the solution.

Drugs commonly used.

F.E.=Fluid Extract. Tc.=Tincture. A.P.=Active Principle. Sol.=Solution. Sp.=Spirits. P.=Powdered. Pot.=Potassium. Sod.=Sodium. Hyp.=Hypodermic. Dil.=Dilute. Ext.=External. dr.=drachm. oz.=ounce. gr.=grain. c.c.=cubic centimetre. gm. = gramme.

Name	*Synonym and formula*	*Action*	*Dose*
Acid Boracic	Boric H_3BO_3	Antiseptic	Ext.
,, Carbolic	Phenol C_6H_5OH	Disinfectant	Ext.
,, Hydrochloric	Muriatic HCl (dil.)	Tonic, astringent	1 dr. (4 c.c.)
,, Hydrocyanic	Prussic HCN (dil.)	For skin diseases	Ext.
,, Nitric	HNO_3	Corrosive	Ext.
,, Picric	Lyddite $C_6H_2\ (NH_2)_3OH$	Used in grease Ext. for burns	Ext.
,, Prussic (*see* Hydrocyanic)			
,, Tannic	$C_{14}H_{10}O_9$	Intestinal astringent	1 dr. (4 c.c.)

PHARMACOPŒIA

Name	*Synonym and formula*	*Action*	*Dose*
Aconite tc. (Fleming's)		Sedative	10 min. (½ to 1 c.c.)
Adrenaline Chloride		Used in local anæsthesia	
Æther	Ether $(C_2H_5)_2O$	Anæsthetic	
	Sulphurous Ether	Heart and lung stimulant	1 oz. (30 c.c.)
Alcohol	Rectified sp. (90%) C_2H_5OH	Heart and lung stimulant. Diuretic and diaphoretic	1 to 3 oz. (30 to 90 c.c.)
Aloes		Purgative	4 to 8 dr. (15 to 30 gm.)
Alum	Potash Alum $KAl(SO_4)_2 12H_2O$	Astringent	2 to 4 dr. (8 to 16 gm.)
Ammonia	Liquor Ammon. NH_4OH	Diffusible stimulant	3 to 6 dr. (12 to 24 c.c.)
Aniseed P.		Aromatic and stomachic	1 oz. (30 gm.)
Antimony et Pot. Tartrate	Tartar emetic $KSbOC_4H_4O_6$	Vermifuge	2 to 4 dr. (8 to 16 gm.)
Antiphlogistine		Antiphlogistic	
Arecolene Hydrobromide		Powerful purgative	1 gr. hyp. (1/15 gm.)
Aromatic Sp. of Ammonia		Diffusible stimulant	1 to 3 oz. (30 to 90 c.c.)
Arsenic liquor	Fowler's sol. As_2O_3	Blood tonic	2 to 8 dr. (8 to 32 c.c.)
Asafœtida tc.		Vermifuge	1 to 3 oz. (30 to 90 c.c.)
Belladonna F.E.		Heart, lung and brain stimulant	1 dr. (4 c.c.)
Calcium Phosphate	$Ca_3(PO_4)_2$	For bone building	1 to 2 dr.
Calomel	Mercury Subchloride HgCl	Liver purgative External for Thrush	1 dr. (4 gm.)
Camphor	$C_{10}H_{16}O$	Diaphoretic and Diuretic, nerve and blood stimulant	1 to 2 dr. (4 to 8 gm.)

Name	*Synonym and formula*	*Action*	*Dose*
Cannabis Indica F.E.	Indian hemp	Antispasmodic, anodyne, stimulant, hypnotic	1 dr. (4 c.c.)
Cantharides P.	Spanish Flies	Blister Int. Aphrodisiac	Ext. 10 gr. (½ to 1 gm.)
Carbon Bisulphide	CS_2	Anthelmintic	2 to 6 dr.
Chloral hydrate	$CCl_3.CH(OH)_2$	Anodyne	½ to 1 oz. (15 to 30 gm.)
Chloroform	$CHCl_3$	Stimulant, antispasmodic, anodyne, vermifuge	1 to 2 dr. (4 to 8 c.c.)
Cocaine hydrochloride		Local anæsthetic	2 to 10 gr. (·15 to ·75 gm.)
Creolin		Disinfectant Internal antiseptic	Ext. 2 dr. (8 c.c.)
Digitalis tc.		Heart stimulant	2 to 6 dr. (8 to 24 c.c.)
Gentian P.		Bitter tonic	1 dr. (4 c.c.)
Ginger tc.	Zingiber	Aromatic, stomachic, tonic	1 to 2 oz. (30 to 60 gm.)
Glycerine	$C_3H_5(OH)_3$	Demulcent, used in poultices	2 to 4 oz. (60 to 120 gm.) Ext.
Iodine tc.	I_2	Causes absorption of enlargements Antiseptic	2 to 4 dr. (8 to 16 c.c.) Ext.
Iron Sulphate	Green vitriol $FeSO_4$	Tonic, vermicide	1 to 2 dr. (4 to 8 gm.)
Lead Acetate	Sugar of lead $Pb(C_2H_3O_2)_2$	Astringent in lotions	1 dr. (4 gm.) Ext.
Linseed Oil (raw)	Never give boiled oil	Emolient, laxative	1 pint (½ to 1 litre)
Lobelia P. or F.E.		Diuretic, diaphoretic. Used in bad wind	1 dr. (4 gm.)
Mercury Perchloride	Corrosive sublimate, $HgCl_2$	Disinfectant	Ext.
Mercury Subchloride (*see* Calomel)			

Name	*Synonym and formula*	*Action*	*Dose*
Morphine sulphate	Morphia A.P. of opium	Anodyne, sedative, antispasmodic, hypnotic	2 to 5 gr. (·15 to ·4 gm.)
Mustard	Sinapis	Counter irritant	Ext.
Nitre (*see* Pot. Nitrate)			
Nux Vomica F.E.		Bitter tonic, heart and nerve stimulant	1 dr. (4 c.c.)
Oil of Turpentine	Spts. of Turps $C_{10}H_{16}$	Antitympanitic, antispasmodic, vermifuge	2 oz. (60 c.c.)
Opium P. or F.E.		Sedative, anodyne, antispasmodic. Decreases bowel action	1 to 2 dr. (4 to 8 gm. or c.c.)
Opium tc.	Laudanum		1 to 2 oz. (30 to 60 c.c.)
Pot. Antim. Tartrate (*see* Antimony)			
Pot. Chlorate	$KClO_3$	For mouth and throat	
Pot. Iodide	KI	Absorbs effused fluids and solid exudates	1 dr. (4 gm.)
Pot. Nitrate	Nitre, saltpetre KNO_3	Alterative, febrifuge	½ to 1 oz. (15 to 30 gm.)
Pot. Permanganate	$K_2Mn_2O_8$	Disinfectant. Also mouth wash	Ext.
Quassia Chips		Anthelmintic	2 to 6 dr. (8 to 24 gm.)
Salol	Phenyl salicylate $HO.C_6H_4COO.C_6H_5$	Intestinal disinfectant	1 to 3 dr. (4 to 12 gm.)
Saltpetre (*see* Pot. Nitrate)			
Silver Nitrate	Lunar Caustic $AgNO_3$	Caustic	Ext
Sodium Bicarbonate	Baking soda $NaHCO_3$	Antacid. Used in flatulence	1 oz. (30 gm.)

Name	*Synonym and formula*	*Action*	*Dose*
Sod. Chloride	Common salt $NaCl$	Stomachic, alterative, mild vermifuge	1 to 2 oz. (30 to 60 gm.)
Sod. Phosphate	Na_2HPO_4	For fractures, bone diseases, skin diseases	3 to 10 oz. (90 to 300 gm.)
Sod. Salicylate	NaC_6H_4COOH	Used in rheumatism and fever	1 to 5 dr. (4 to 20 gm.)
Sod. Thiosulphate	Hypo $Na_2S_2O_3$	Blood antiseptic	½ to 1 oz. (15 to 30 gm.)
Spirits Nitrous Ether	Sweet sp. of nitre Spts. æth. nitrosi	Diffusible stimulant, carminative, antispasmodic	1 to 3 oz. (30 to 90 c.c.)
Spirits Aromatic (*see* Aromatic)			
Strychnine Sulphate	A.P. of nux vomica	Digestive, respiratory and heart tonic	½ to 2 gr. hyp. (·04 to ·15 gm.
Sulphur	S.	Mild laxative used in skin diseases	2 to 4 oz. (60 to 120 gm.)
Tartar Emetic (*see* Antimony)			
Turpentine (*see* Oil of Turpentine)			
Zinc Oxide	ZnO	External astringent. Used as eye wash	Ext.
Zinc Sulphate	White vitriol $ZnSo_4$	Astringent and styptic	1 dr. (4 gm.)

The dose for fluid extract is generally the same as for the powder. A tincture is usually one-eighth the strength of a fluid extract.

Prepared tablets only should be used for hypodermic purposes; these should be kept in a dry, cool place. The tubes, which hold ten or twenty tablets, have the number of grains in each tablet clearly marked on the outside.

PHARMACOPŒIA

Useful compounds.

Ammonia, dilute:

Liquor ammonia fort.	1 part
Water	2 parts

Ball, Aloes (*see* page 272):

Barbadoes Aloes	8 dr., or 30 gm.
Calomel	1 dr., or 4 gm.
Ginger	2 dr., or 8 gm.
Petrolatum or Vaseline	½ dr., or 2 gm.

Glycerine, sufficient to mix.

Grind the solids fine in mortar.

Carron Oil:

Raw Linseed Oil	1 part
Lime Water	1 „

Shake well before use.

Dick's Lotion (*see* Lotion, White).

Lime Water:

Saturated solution of lime in water.

Lotion, White (Dick's):

Lead Acetate	1 part
Zinc Sulphate	1 „
Water	40 parts

Shake well before use.

Ointment of Iodine:

Iodine	1 part
Pot-Iodide	1 „
Glycerine	3 parts
Lard	20 „

Rub the first three ingredients together in mortar, then work in the lard.

Ointment of Zinc; 15%:

Zinc Oxide	3 parts
Lard	17 „

Tonic Powder:

Nux Vomica P.	1 part
Iron Sulphate P.	1 „
Gentian P.	1 „

Give two teaspoons in feed, morning and night.

Incompatibility of Drugs.—To avoid explosions or poisoning do *not* mix: Potassium chlorate, permanganate and nitrate, and silver nitrate *with* sulphur, tannic acid, sugar, glycerine, pot.-ferrocyanide and dry vegetable powders: it may cause an explosion.

Do not mix arsenic or any alkaloid (morphine, strychnine, atropine) *with* iodides, bromides, caustic potash and soda, and pot., sod., and ammonium carbonate: it will cause precipitation and possible poisoning.

Acids *with* alkalis (as ammonia): they neutralize.

Strong acids *with* any drug: they decompose the drug.

Poisons and Antidotes.—When a horse is poisoned, effort must be made to ascertain the nature of the poison. A horse cannot be made to vomit normally. The poison must be eliminated from the system as soon as possible by purgatives, diuretics, diaphoretics, and the chemical rendered inert. High temperature must be reduced by sedatives, the internal irritation by demulcents, and narcotic effects by stimulants, followed after by tonics.

Four or five times the normal dose of an antidote can be given.

Poison	*Antidotes*
Acid Carbolic	Turps, castor oil, strong tea and coffee.
Alkaloids	Animal charcoal, ether, diffusible stimulants.
Antimony	Tannic acid, oil.
Arsenic	Iron salts, lime water, raw eggs and gruel.
Belladonna	Opium and strong coffee.
Carbon Dioxide	Fresh air, diffusible stimulants.
Chlorine Gas	White of egg, milk, flour, ammonia.
Chloroform	2% prussic acid, strychnine.
Cyanides and Prussic	Chlorine gas, ammonia, chalk, cold ablutions.
Hemlock	Oil purgatives, diffusible stimulants.
Iodine	Starch, demulcents.
Lead salts	Sod. sulphate, linseed oil, milk, opium.
Mercury salts	Eggs, starch, milk, albumen, wheat-flour, iron salts.
Nux Vomica or Strychnine	Pot. bromide; chloroform, large dose (up to 8 oz., 250 gm.) chloral hydrate.
Opium or Morphine	Animal charcoal, pot. permanganate. Give exercise, oil purgatives.
Phosphorous	Turps, gallic acid.
Strychnine (*see* Nux Vomica)	
Tobacco or Nicotine	Strong tea, oil purgatives, strychnine, diffusible stimulants.
Yew	Purgatives, mucilaginous drinks.
Zinc Salts	Milk, white of egg, tannic acid, warm water.

Apparatus to be kept in Stable Pharmacy.—2-dr., 4-oz., and 1-pint graduated glass measures, or 10-c.c., 100-c.c., and ½-litre. Clinical thermometer in case. 12-in. mortar and pestle. Spatula and 18-in. square of plate glass. Bandages, cyanide gauze, tow, medicated wool; needles and silk. Hypodermic syringe set. Set of small scales. Oral syringe for medicines. Strong glass drenching bottle. Enema pump. Catheter. Trocar and cannula. Labels for all drugs; these should be waxed over. Poison labels.

Purgatives.—Purgation is produced by increasing the action of the bowels (peristalsis), by the use of laxative food, linseed oil and the drastic purgatives, as arecolene; by increasing the intestinal secretions, by the use of aloes and calomel, and arecolene; and by checking the absorption of fluid in the large intestines,with laxative salts.

Purgatives are used to draw the blood to the intestines from other parts of the body in disease; from the feet in founder, and from the brain in brain diseases.

A horse has about 550 square feet of intestine for the drug to act upon.

Purgatives must not be given in lung diseases, gastritis, enteritis, influenza, high fever, and advanced pregnancy, but small doses of linseed oil will do no harm. Calomel is the best liver stimulant, and should be given in a ball or pint of linseed oil.

The horse must always be prepared for a day on soft mashes when possible.

An enema will increase the action of a purgative; so will an empty stomach.

Epsom salts (magnesium sulphate) should not be given as a purgative to a horse. If a ball does not act in 24 hours, give a pint of raw linseed oil, and repeat this in 5 hours if necessary. Aloes must always be combined with ginger or nux vomica. The horse should not be worked until the action of the purgative has finished.

A ball should never be greater than 1 in. in diameter, and 3 in. long. They are generally wrapped in thin waxed paper.

WEIGHTS AND MEASURES

Imperial Liquid Measure.

60 minims (m) = 1 fluid drachm (f ʒ) (fl. dr.).
8 fl. drs. = 1 fluid ounce (f ℥) (fl. oz.).
20 fl. ozs. = 1 pint (O) (pt.).
8 pts. (160 ozs.) = 1 gallon (C) (gal.).

Wine Measure. American Liquid Measure.

60 minims = 1 fluid drachm.
8 fl. drs. = 1 fl. oz.
16 fl. ozs. = 1 pt.
8 pts. (128 ozs.) = 1 gal.

American minim is 1·05 times the Imperial minim· therefore the American drachm and ounce are larger.

Household Liquid Measure (approximate).

1 drop of water = 1 minim.
1 teaspoon = 1 fl. dr.
1 dessertspoon = 2 fl. dr.
1 tablespoon = 4 fl. dr. = ½ fl. oz.
1 wineglass = 2 fl. ozs.
1 teacup = 5 fl. ozs.
1 tumbler = 8 fl. ozs.

Standard Volumes.

Water at 62°F. and 30 in. barometer.

1 Imp. fluid ounce weighs 1 oz. avoirdupois = 437½ gr.
1 gallon weighs 160 ozs. = 10 lb.
1 cubic foot of water = 62½ lb.
1 cubic inch = 252 grains.
1 wine measure fl. oz. = 454·6 grs.

480 m. water = 1 oz. (avoir.) = 437½ grs. Therefore 1 (Imp.) min. of water weighs a little less than 1 grain.

Solid Weights (Avoirdupois). (1 oz.= 0·9115 Troy or Apothecaries' ounces.)

16 drachms = 437½ grains = 1 ounce.
16 ozs. = 7,000 grs. = 1 pound (lb.).
28 lb. (America 25 lb.) = 1 quarter.
4 quarters = 112 lb. (America 100 lb.) = 1 hundredweight (cwt.).
20 cwts. = 2,240 lb. (America 2,000 lb.) = 1 ton.

All drugs are bought and sold by Avoirdupois.

Apothecaries' Weight:

20 grains = 1 scruple (℈).
3 scruples = 60 grs. = 1 drachm (ʒ).
8 drs. = 480 grs. = 1 ounce (℥).
12 ozs. = 5,760 grs. = 1 pound (℔).

All dispensing is done by this weight. The *grain* of all weights is constant.

Grain Measure, or Dry Measure. (*See* page 150.)

WEIGHTS AND MEASURES

Hay and Straw Weight.

1 truss hay = 56 lb. (new hay 60 lb.).
1 truss straw = 36 lb.
1 load = 36 trusses.
1 load old hay = 2,016 lb., new hay = 2,160 lb., straw = 1,296 lb.

English Linear.

12 inches (") = 1 foot (')
3 feet = 36" = 1 yard.
220 yds. = 1 furlong.
8 furlongs = 1,760 yds. = 1 mile = 63,360".
4 inches = 1 hand (horse measure).

Metric System (liquid).

1 cubic centimetre of water at 39°F. (4°C.), and
30" barometer (760 mm.) = 1 gramme (gm.).
1 litre = 1 kilogramme.
1,000 c.c. = 1 litre = 35 fl. oz. (approx.) = 1¾ Imp. pt.

Metric Weight.

1 gramme = 15·432 grains.
1,000 gm. = 1 kilogram = 2½ lb. (approx.)
100 gm. = 1 hectogram.
10 gm. = 1 decagram.
·1 gm. = 1 decigram.
·01 gm. = 1 centigram.
·001 gm. = 1 milligram. (= $\frac{1}{64}$ gr.)

Metric Linear.

1 metre = 1 forty-millionth part of the earth's circumference
= 39·3708 inches.
1,000 metres = 1 kilometre = ⅝ mile (approx.).
·01 metre = 1 centimetre = ⅖ in. „
·001 metre = 1 millimetre = $\frac{1}{25}$ in. „

Comparison between English and Metric Weights and Measures.

1 Imperial fl. oz. water = 1 oz. av. = 437½ grs. = 28·35 gm. (32° F.).
1 gramme = 15·432 grains.
1 gm. = 1 c.c. water (at 39° F., 4°C.).
1 fl. oz. (Imp.) = 28·417 c.c. 1 fl. dr. = 3·55 c.c.
1 grain = ·0648 gramme.
1 oz. avoir. = 28·35 gm. 1 pound, avoir. = 453·6 gm.
1 oz. apoth. = 31·1 gm. 1 dr. apoth. = 3·9 gm.
1 cwt. = about 50 kilograms.
1 ton = about 1,000 kilograms.
1 c.c. = ·061 cubic in.

1 cubic in. = 16·387 c.c.
1 mile = 1·6 kilometres.
1 gallon = 4½ litres (approx.) = 4,546 c.c.
1 pint = 568 c.c.
1 minim = ·059 c.c. Am. m. = ·062 c.c.
1 c.c. = 16·89 minims = ·035 fl. oz. = 16·23 Am. minims.
1 inch = 25·4 millimetres.
1 foot = 30·48 centimetres.
1 yard = ·914 metres.

GLOSSARY OF TERMS

Alteratives: drugs that change the condition of organs; aloes, arsenic, calomel.

Anæsthetics: drugs that cause insensibility and unconsciousness; ether, chloroform, nitrous oxide.

Anodynes: drugs that allay pain; opium, chloral hydrate.

Anthelmintics: drugs that destroy or expel worms; aloes, asafœtida, quassia, carbon bisulphide.

Antiphlogistics: drugs that counteract inflammation; antiphlogistine, reducine.

Antipyretics: drugs that reduce fever; aconite, nitre, camphor.

Antispasmodics: drugs that allay muscular spasms; turps, cannabis indica, spirits of nitre.

Antitympanitics: drugs that reduce tympanites; turps, ammonia.

Aphrodisiacs: drugs that excite the sexual appetite; blood and nerve tonics, phosphorous.

Aromatics: drugs that counteract griping; spirits of nitre, ammonia, ether.

Aseptic: free from septic material.

Astringents: drugs that contract tissues and check secretions; alum, tannic acid.

Bacillus (bacilli): a rod-shaped vegetable micro-organism.

Bacterium (bacteria): vegetable micro-organism.

Cannula: a tube for insertion into the body.

Carminatives: drugs that relieve flatulence; spirits nitre, ammonia, soda bicarbonate.

Catheter: a tube for emptying the bladder.

Contagion: the communication of disease by contact or effluvia.

Counter-irritants: drugs that stimulate the skin; liniments, blisters.

Demulcents: drugs that soothe and soften the mucous membrane; glycerine, oil.

Diaphoretics: drugs that increase action of skin glands; spirits nitre, ammonia, ether, alcohol.

GLOSSARY

Diuretics: drugs that stimulate secretion of kidneys; turps, ether spirits nitrous ether.

Electuary: powdered drugs made into a paste with syrup.

Embryo: the fœtus in its earlier stage of development.

Emulsion: an oily or resinous substance held in suspension in a liquid by a mucilaginous agency.

Enema: clyster or injection (into the rectum).

Febrifuges: drugs that counteract fever; aconite, camphor, soda bicarbonate.

Fœtus: the unborn in the womb, after the embryonic stage.

Histology: the study of the composition of tissues.

Hypnotics: drugs that produce sleep; opium, chloral hydrate, cannabis indica.

Immune: protected against a disease.

Infection: *see* Contagion.

Inflammation: the condition into which tissues enter as a reaction to irritation.

Inoculation: the insertion of a virus into tissue in order to produce a disease, or to produce the antibody of that disease.

Laxatives: drugs that produce gentle purging; green food and roots, linseed oil, soft bran mashes.

Micro-organisms: minute vegetable and animal germs.

Micturate: to pass urine.

Mucous Membrane: an epithelial membrane that lines canals and cavities which communicate with the air.

Narcotics: drugs that produce stupor; ether, cannabis indica, chloral hydrate, opium.

Neurectomy: the excision of a part of a nerve.

Peritoneum: the serous membrane that lines the abdominal walls.

Physiology: the science of the living organism.

Prognosis: a forecast of the course of a disease.

Psychology: the science of the mind.

Sedatives: drugs that reduce action of the nervous and vascular system; soda bicarbonate, camphor, aconite, nitre.

Serum: the clear liquid part of the blood.

Stimulants: drugs that increase the functions of the glands and whole body; ether, spirits nitre, alcohol, chloroform, ammonia, ginger, gentian.

Stomachics: drugs that improve appetite and assist digestion; spirits nitre, ether, alcohol, ginger, gentian.

Tonics: drugs that improve the blood, nervous and digestive systems; arsenic, iron, nux vomica, vegetable bitters.

Toxin: any poisonous albumin produced by bacterial action.

Trocar: a sharp instrument used with a cannula for piercing a cavity wall.

Tympanites: distension of the belly due to the presence of gas.
Urethra: the canal that leads from the bladder to the surface.
Vagina: the canal from the vulva to the womb.
Vascular: well supplied with blood.
Vermicides: drugs that destroy intestinal worms.
Vermifuges: drugs that expel intestinal worms.

INDEX

Abscess, causes and treatment of, 237, 259, 263
Acids, 65, 137, 298
Action, 49–50, 51
Action lessons, 49
Affection, 24, 25, 27, 35
Age, and the teeth, 293 *et seq.*
Aids, 83
Ailments, common, 275–81
Air, composition of, 209
Alexander the Great, 5, 17
Alfred the Great, 9
Alfalfa, 144, 158
Alimentary canal, 138
Alterative, roots as, 151
Amble, the, what it is, 85
America, law regarding tying up harness-horses in, 95
Ammonia, 106, 127, 212; solution, 127, 130
Anæsthesia, 268
Anæsthetics, general and local, 194, 238, 251, 265–8; use of, 266 *et seq.*
Anæsthetizing, 266–7
Anatomical terms, 244
Ancestors of the horse, 1–2
Animal composition, 137
Animal hospital, the first, 7
Anthrax, 259
Antidotes to poison, 304
Antiseptics, 181, 235, 238, 250, 257–60, 261
Apothecaries' weight, 306
Appetite, as indicator of requisite food, 139
Appetite, depraved, 73, 207; treatment of, 275
Applications, external, 246
Apsyrtus, 8
Arab horse, 3, 9, 12, 16, 27, 67
Armenia, horse-breeding in, 5
Artery, clot in (*see* Thrombosis)
Asepsis, 257
Aseptic surgery, 260; precautions to be observed in, 263
Asoka, Buddhist Emperor of India, 7
Associations 31, 38–40, 49, 50, 54, 58, 74, 91, 172, 228, 272
Assurbanipal of Nineveh, 5
Asthma, causes and treatment of, 284
Astley, Philip, 53
Astride-riding, 83
Astringents, 119
Avoirdupois weight, 306
Axe, Professor, 134
Azoturia, causes and treatment of, 60, 61, 279–80

B

Back, anatomy of, 96 *et seq.*; conformation of, 96; weight-bearing portion of, 97, 100–1
Back-pad, 124
Backs, sore, 70, 84, 100; prevention and cure of, 108–9
Bacteria, 204, 213, 257, 258
Bacterins, 259
Bacteriology, 258–9
Bad habits, 183, 204–7
Balance, acquisition of by rider, 77

INDEX

Balance and weight, 117-18
Balking, cause of, 92
Balling, 40, 272
Balls, 305
Banbury-Pelham bit, 113
Bandages, 51, 64, 74, 75, 168, 174, 177, 178, 245
Banging the tail, 175, 191
Bare-back riding, 5, 6, 54, 77
Barley, 150
Bar shoes, 232-3
Bars of the mouth, 114, 272; of the foot, 223, 224
Beans, 60, 151
Bearing-reins, 94, 131-4
Bedding and bedding down, 179-81
Bell, George, 67, 68
Bell-races, 10
Bend Or, 14
Bentinck, Lord George, 14
Berenger, 9
Beri-beri, a cause of, 147
Bible records, 2, 3, 4, 8
Billeting the horse, 71
Binds (or Presses), 235-6
Biting, 206
Bits, 4, 5, 48, 94. 111-14, 126
Bitting, art of, 5, 52
Blanket. saddle, 101
Blanketing the horse, 87
Blankets, 127
Bleeding, arresting, 261
Blinkers (or Blinders), 40, 125-6
Blistering. 246 250
Blisters, 251
Blood circulation. 102, 209
Blood clots, 280
"Blood" horses, 12
Blood, horses' fear of, 41
Blood poisoning, 62, 65, 259; treatment of, 286
Blood supply, 137; stimulation of, 166-7
Bog spavin, 243, 250, 255 (*cf.* Spavin)
Bolting food, preventives for, 141, 152
Bone diseases, 97, 100, 253
Bone-pressure, test for, 105
Bones, histology of, 244-5
Bot-fly as disease carrier, 203, 277; drench for, 278
Bowels, inflammation of. 61, 276-7; care of on voyages, 73
Brain disorders, 133
Brain of horse, 19, 20
Bran, 141; stowage of, 221
Bran mash, 153
Branding, 251
Breast-cloths, 124
Breast-collars, 120
Breast-pads, 124
Breast-straps, 120
Breath, condensation of, and prevention of, 124
Breathing, interference with, 135
Breathlessness, cause of, 65
Breeching, 123-4
Breeding, 8, 9 *et seq.*, 287; precautions against unsoundness in, 287; best time for, 288
Bridle lameness, 241
Bridles, 5, 8, 111
Bridling, 39, 111
Brittle feet, 223, 238; cause and treatment for, 238-9
Brood mares, jealousy of, 27
Brow-band, 111, 126, 128
Bruises, 235, 243
Brushes, grooming, 168, 169, 170, 175, 189, 191
Brushing-boots, 184, 264
Brushing, cause and treatment of, 263-4
Bucephalus, 6
Bucking, 105
Bulk in food, 69, 141
Burns, applications for, 265
Byerly Turk, 12

C

CÆSAR, JULIUS, 7, 8
Calks (or Calkins), 232, 234
Calpurnius, 8

INDEX

Camera hints for horse photography, 134–5
Camp, horses in, 71–3
Camping-grounds, sanitation of, 72
Cannula, 273
Canter, 51, 54, 66, 77, 84
Caresses, 24, 34, 35, 37, 38, 40, 41, 42, 47, 51, 56, 83
Carrots, 74, 151–2
Cartilage, lateral, 226, 254
Cataract, as bar to breeding, 287
Catheter, passing the, 273–4
Cats for forage stores, 145
Cavesson, 36, 47
Ceilings, fireproof, 213
Cells, animal, 137, 165
Chaff, 141, 148
Character, on what it depends, 26
Characteristics, special, 25–8
Chariot racing, 3, 8
Charles I, and turf sports, 11
Charles II, as horseman, 11
Check ligament, 248
Check-reins, 33, 132–3, 188
Cheek-pieces of bit, 114
Chester Cup, 14
Chestnuts, 166
Chills, cause of, 167
Chloroform, 265, 266, 267
"Chop," ingredients of, 140, 148, 150
Christian duty, 207–8
Circulatory system, 209
Circus horses, 51, 52–7
Cleaning grain, 151
Clicking (or Forging), 236
Clipping, 185–7
Clips, 231–2
Clothing, 129–30, 175–6; cleaning of, 130, 175; tearing of, by horses, 206
Clover, 158
Coach-houses, 216, 218
Coat, horse's, 32, 165, 173–4, 185
Cocaine, 57, 243, 268
Cold, cause and treatment of, 283
Cold back, remedy for, 105
Cold bits, 114–15
Colic, 63, 154, 160, 205; symptoms and treatment of, 276, 277
Collar-galls, 110, 118; treatment of, 121 (*cf.* Galls)
Collar injuries, 92, 118, 119, 120–1
Collars, 118–20; breast-, 120
Colts, open-air exercise necessary for, 64
Columella, 8
Comb, 170, 175
Communication, power of, 28–9
Company, horse's love of, 70, 137
Compounds, useful, 303
Condition, meaning of, 58; method of obtaining, 59; and long-distance rides, 66
Condition powders and food, 61
Conditioning horses, 59–61
Conformation of saddle-horse, 85
Congestion of the lungs, 167
Connaught, Duke of, 201
Constipation (Impaction colic), causes and treatment of, 277
Contagious diseases, 162, 257, 283–285
Copying others, trait of, 27
Corn, Indian (*see* Maize)
Corns, causes of, 229, 232, 237; treatment for, 237
Cough, cause and treatment of, 283
Courage, 27
Crécy, battle of, shortage of horse at, 10
Crib-biting, 154, 205
Cromwell, Oliver, forbids horse-racing, 11
Croup sores, 121
Crowding in stall, 206
Cruelty, 7, 12, 43, 56, 82, 122, 125 132–4, 195, 196, 197, 207–8
Crupper, 121, 124, 126
Cups of teeth, 294, 296
Curb, and treatment for, 248, 250
Curb-chain, 48, 112
Curb-straps, 112
Curry-comb, 170, 175

INDEX

D

DAMP, 127, 213
Damp saddles, consequences of, 105
Dandruff, 165
Dark stables, 213
Darley Arabian, 12
Davy, Sir Humphry, 265
Dealers, 9, 41, 56, 58, 296
Debility, 144; casualties due to, 70
Derby, the, established, 13
Dermis, 165
Destruction, humane, 268-9
Diabetes insipidus (Polyurea), causes and treatment of, 279
Diabetes mellitus, cause of, 157
Diarrhœa, causes and treatment of, 278
Diet, for sea voyage, 73; on what nutritive value of depends, 145
Digestion, 3, 137
Digestive organs, 137
Disease, carriers of (*see* Flies, Mosquitoes, etc); theory of, 257
Diseases, micro-organic, 257 *et seq.*
Disinfectants, 128-9, 182, 259, 260
Dislocated patella, 244, 257
Dislocations, 256-7
Disobedience, and how cured, 33-5
Diuretics, 246
Docility, 27
Docked tails, trimming of, 192
Docking, practice of, 12, 33, 91, 175, 195 *et seq.*; fashion responsible for, 195-6; humane societies and, 197, 198-9; War Office forbids purchase of docked horses, 200; horse-shows and, 200; denunciation of, by the Press, 201-2
Doors, 216, 219
Dosage, 298 *et seq.*
Doses, 298-302
Drainage, 218; importance of, 212
Drains, 182
Draught, theory of, 115 *et seq.*
Drenching, 40, 51, 272-3
Dressing wounds, 235, 261, 263
Dressings, leather, 127, 128
Drinking, 159 *et seq.*
Driving, 85-9
Drugs, 33, 57, 61, 272; therapeutical classification of, 298-302; incompatibility of, 303-4
Dry measure, 150, 306
Drying the horse, 168
Dung, 155, 212, 271
Dung-eating, cure for, 207

E

EAR, 171-2; hairs in, 187
Ear-drooping, 71
Ears, 32, 50; cropping of, 12; sore, 155; method of drying, 169; flies in, 171
Eclipse, 12
Economy, stable, 136, 142, 181
Eczema, causes and treatment of, 202, 281
Edward II, imports war horses, 9
Edward III, encourages horse-breeding, 9, 10
Elbow, capped (or Shoeboil), causes and treatment of, 256
Electric shock, 265
Electuary, 283
Elizabeth, Queen, interest in the turf, 10
Emphysema, causes and treatment of, 142, 284
Endurance tests, notable, 66-8
Enema, how given, 273
Enteritis, causes and treatment of, 61, 276-7
Entraining horses, 75-6
Eohippus, 1
Epidermis, 165
Epilepsy, causes and treatment of, 285
Equine fossils, 2, 3
Equine machine, 19
Equitation, definition of, 44
Equus Caballus (or modern horse), 2
Ergots, 166
Erichthonius of Troy, King, 4

INDEX

Eruption of teeth, 295–6
Erythema, causes and treatment of, 281
Erythrocytes, 209
Eserine, as cause of shivering, 33
Ether, 266
Etymology of horse, 1
Exercise, 46, 59. 62–5, 75; bandages for, 64; and blood supply, 167
Exfoliation of skin and hair, 166
External applications, 246
Exuberance of spirits, 27, 34. 37, 46, 94, 136
Eye, 32, 125; diseases of, 40, 280, 281; effect of ammonia on, 212
Eye-fringes, 81, 188

F

Fæces, 271; worms in, 277 (*Cf.* Dung, Manure)
Farm horses, feeding, 143
Farriers, common faults of, 234–5
Fashion, 134, 195–6, 197, 199
Fatigue, 58, 65
Fear, susceptibility to, 25, 40–1
Feathering, 233
Feeding, 59–61, 136 *et seq.*; on the road, 69; on board, 73–4; principles of, 138; best method of, 141, special, 142–3; after foaling, 144, 291·2
Feeling, sense of, 20
Feet, examination of, 69, 80, 169, 174, 178; washing the, 169; brittle, 183; stopping, 183; care of, 212; faulty, 227, 228, 236; sore, 231; unshod, 235
Feral horses, 15, 20, 33, 45
Fetlock-brushing, 184
Fetlock sprain, and treatment for, 243, 248
Fever, inoculation as preventive of, 74; carriers of, 203, 204
Filled legs, 174, 175
Fire-extinguishers, 221
Fire precautions, 74, 182, 221
Firing, 250, 251
Fistulous withers, causes of, 118, 133, 259, 265
Fitzwygram, Gen. Sir F., cited, 208
Flat feet, 236
Fleming, Dr., 134, 143, 200
Flies, 72, 81, 90, 134, 155, 171, 203–4
Floating the teeth, 293–4
Floors, 76, 179, 182, 217–18, 222
Fly muscle (*see* Panniculus Carnosus)
Fly-nets, 72, 204
Fly-screens, 216
Fly-sheets, 72
Fly-whisks, 81, 204
Foal, care of feet and teeth of, 235, 292–3; birth of, 289; care after birth, 290–3; weaning the, 292
Foaling, feeding after, 144, 291–2
Foaling signs, 289
Food, and its distribution, 19; bulk in, 69, 141, 151; composition of, 145–7
Foods, and their values, 144 *et seq.*; condition, 147 *et seq.*; vitamins in, 147
Foot, care of, 69, 70, 174 *et seq.*, 223 *et seq.* (*passim*); structure of, 223; mechanism of, 226; preparation of, 228
Forage, stowage of, 75, 144–5, 221
Forelock, 188
Forge tools, 236
Forging (or Clicking), 236
Foundations, 213, 217
Founder, causes and treatment of, 61, 63, 142, 161, 167, 239–40 (*see* also Laminitis)
Four-in-hand driving, 4, 88–9
Fractures, 256–7
France, early popularity of racing in, 9
Frog, 179, 180, 224, 226, 227, 232
Frog-pad (*see* Plantar cushion)
Frost-bite, 167, 265
Frozen bits, 114
Fullering, 229

INDEX

G

Gad-fly, 203, 277
Galling, prevention of, 61
Gallop, 84
Galls, causes and cure of, 96, 100, 102, 108, 109–11, 118, 119, 120–1
Gangrene, 200
Galtee More (Derby winner), 142
Gastritis, 61, 276
Genital organs, defective, as bar to breeding, 287
Geology of horse. 1
George III, condemns cropping of ears and docking of tails, 12
George V, King, 201
Germicides, 260
Germs, 257 *et seq.*
Girth covering, 107, 109
Girth-galls, 109, 110, 121 (*cf.* Galls)
Girthing up, 97, 105
Girths, 106–7
Glanders, cause and treatment of, 285
Glands of skin, 164–5
Glossary of terms, 308–10
Gloves, 129–30
Godolphin Arabian, 12
Gorse, 159
Gough, Colonel, 81
Gradation in training, 47, 50, 59, 75
Grain, 63, 139, 140, 147–8; stowage of, 145; cleaning, 151
Grain measure, 149, 150, 306
Grand National Steeplechase, the first, 13
Grant, General, cited, 95
Grasses, 158–9
Grazing, 154–5
Grease, causes and treatment of, 165, 281
Greeks, horsemanship of, 5–7
Green food, 66, 72, 139, 154
Grooming, 59, 64, 70; theory of, 164 *et seq.*; method of, 168–72; test for, 173
Grooms, 173
Grosvenor family as Derby winners, 14
Gruel, 141, 153
Gun-fire, horses and, 22

H

Habits, bad, 22–3, 27, 31, 36, 37, 91 *et seq.*, 126, 154, 204–7
Hair. 165, 170, 172, 175
"Half-bred," first use of term, 12
Halter pulling, 206
Halters, 73, 126
Hame-rein, 131, 133
Hames, 119, 120, 124
Hampden, 13
Hands, 77, 78–9, 113
Harness, 69, 123–8; storing, 74, 127; fitting, 100 *et seq.*, 123 *et seq*; care of, 106, 108, 126
Harness injuries, 109, 110, 118, 120, 121, 127
Harness-room, 128, 218
Harnessing up, 39, 123
Hay, 146, 156–8; dust in, 140, 157; stowage of, 145, 221
Hayes, Captain, 193
Hay-nets, 72, 73, 142
Hay weights, 157, 307
Head-stall of bridle, 111
Hearing, sense of, 20, 22, 30, 86, 87
Heart, 209; disease, 257; how to take heart sounds, 271
Heat, action of on coat, 63, 173, 174; effect on horse, 71
Heating of stable, 219
Heaves, causes and treatment of, 284
Heber, Bishop, and the Arab horse, 16
Heels, contracted, causes of, 233, 237
Heels, cracked, 281
Henry III, and breeding, 9
Henry VII, and breeding, 10
Henry VIII, as sportsman, 10
Herodotus, 4, 5
Hidebound, indications of, 281
Hip-joint muscles, sprain of, 244
Hipparion, 2, 22

INDEX

Hobbles, 73, 252
Hock, capped, 255; treatment for, 256
Hock lameness, 243
Hogged manes, 4, 167, 190
Homer, 4, 5
Homing instincts, 29
Hoof, 223–4; care of, 64, 169; diseases of, 162, 212, 223; split, 238
Horace, 7
Horn, growth of, 224, 226
Horse, meaning of word, 1; zoological position of, 2; history of, 3 *et seq.*; beauty of, 4; at liberty, 53, 54; care of on the road, 68–71; in camp, 71–3; entraining, 75–6; tying up, 94–5; off its feed, 159; shoeing, 227 *et seq.*; detection of lameness in, 241 *et seq.*; in sickness, 270 *et seq.*
Horseback exercise, 81
Horse-breakers of the past, 45, 46
Horse-cars, best type of, 76
Horse-cloths, early, 5
Horsemanship, definition of, 44; as science, 59
Horsemastership, 70, 136, 137
Horse-racing, denounced by public speakers and clergymen in England, 10
Horse shows, 81, 200
Horse trainers and horse doctors, early, 7
Horses, sacrificed to the gods, 7; outline of the world's, 14 *et seq.*; care of on the march, 68, 71, 81, 162; aged, 207; sick, loose-boxes for, 219
Hospitals for horses, 7
Hot feeds, 141, 153
Household measures, 306
Humane destruction of horse, 256, 257 268–9
Humane training, 45, 53, 80, 125, 126, 131
Hunter, girth of, 85; feeding of, 143–4
Hypertrophies, 166
Hypodermic injections, 243, 268, 273
Hyracotherium, 1

I

Icterus (*see* Jaundice)
Immunization, 259
Impaction colic (*see* Constipation)
Impatience, signs of, 32
Impurities, excretion of, 161
India-rubber bits, 114
Indications, 51
Indicators, 79, 82, 83, 88
Indigestion, causes and treatment of, 139, 141, 148, 205, 275–6, 293
Infectious diseases, 257, 283 *et seq.*
Inflammation of lungs, 284
Inflammation, treatment for, 245, 246, 253
Influenza, symptoms and treatment, 284–5
Inhumane training, 56
Injections, rectal, 273
Injuries, 57, 97, 100, 108, 109, 110, 118, 120–1, 133; aseptic treatment of, 260 *et seq.*
Inoculation, 74, 259
Instinct, 29
Intelligence, and examples of, 22–4, 30, 31
Inter-dental space, 114, 272
Intestinal trouble, 140, 142, 162, 167, 276, 277
Itch, treatment for, 282

J

Jack (*see* Spavin)
James I, encouragement of horse-racing and breeding by, 10
James, Duke of Monmouth 10
Jaundice (Icterus), symptoms and treatment of, 279
Jealousy, 27
Jibbing, cause of, 92
Jogging, 63, 84
John, King, imports Flemish horses, 9
Joint-ill, 288

INDEX

Jumping, 27, 39, 49, 52, 78, 81–2, 92: record jumps, 85

K

Kicking, and prevention of, 24, 32, 37, 39, 72, 92, 123, 204–5
Kicking-strap, 123
Kidney, inflammation of (Nephritis), causes and treatment of, 279
Kidneys, flushing the, 61
Kindness, 38, 40, 41, 92, 181
Knee-caps, 184; dislocated, 257
Knee-halters, 73
Knees, care of, 220; dressings for broken, 264

L

Ladies riding, 83–4
Lameness, causes of, 59, 223, 235, 237, 238, 240, 241 *et seq.*, 253, 254, 255, 293; detection of 241–4
Laminitis (or Founder—*q.v.*), causes and treatment of, 70, 161, 238, 239–40, 243
Lampas, cause and treatment of, 275
Landseer, animal paintings by, 11
Laryngitis, 133, 275
Laxatives, 152, 154, 305
Leading into stable, 184
Leading-rein, 36
Leather, effect of ammonia on, 212
Leather dressings. 127–8
Leg, care of. 51, 63, 70, 169, 174–5, 178; use of, 100; tar on, 265
Leg-bandaging, 64, 74, 168, 174, 177, 178
Lending horses, risk of, 68
Liberty, horse at, 53, 54
Lice, extermination of, 283, 293
Lie down, refusing to, 207
Ligaments, 63, 100, 247, 248; histology of, 244
Ligamentum nuchæ, 97, 244
Light, 213; action on coat of, 173–4
Lightning, 265
Linear measure, 307
Liniments, 246–7
Linseed, 61, 153; meal, 144; cake, 153; mash, 153; oil, 153; tea, 153
Lip-strap, 112
Lip-twitching, 71
Liquid measures, 305–6
Lister, Lord, 261
Litter-shelters, 180, 218–19
Liver diseases, 167, 279
Liverpool bit, 113, 126
Livy, 8
Loading horses, 74, 75
Loads, 115 *et seq.* 122–3
Lockjaw, cause and treatment of, 285–6
Loft, 221
Long-distance rides, 66–8
Loose-boxes, 60, 219
Lope, the, explanation of, 85
Lotions, 121, 203
Love for horses, 44, 86, 159, 173
Love of horses for man, typical instances of, 24–5
Lucerne, 144, 158
Lung diseases, 167; treatment of, 284
Lunging, 47
Lungs, congestion of, 167; inflammation of, 284; effect of ammonia on, 212
Lymphangitis, causes and treatment of. 60, 61, 280

M

McEwen, Professor, 52
McGillivray, Professor, 46
Mahomet, 8, 9
Maize, 150
Malaria, carriers of, 203, 204
Mallenders, 281
Malpractice with the teeth, 293
Manège, 47, 54, 222

INDEX

Manes, hogged, 4, 167, 190–1; care of, 170, 188–9; plaiting, 189; re-growing, 191; disease of tails and, 202–3
Mange, treatment for, 172, 203, 282
Mangels, 152
Mangers, 140, 220
Manure, 72, 155, 212
Mare, œstrum of, 287, 288; in foal, 288
Martingales, 115
Mashes, 61, 73, 139, 141, 148, 152, 153
Massage, 166, 174, 245, 250
Measures, 149–50, 305–8
Melanosis, 166
Membrana nictitans, 271
Memory, faculty of, 31, 38, 50, 56
Meningitis, 133
Mental influence, 52
Merychippus, 2
Mesohippus, 2
Metric system, 307
Metritis, treatment of, 286
Mice, 144
Microbes, 257, 258
Micro-organisms, 257
Mind of horse, 20, 22
Molasses, 154
"Monday-morning ills" (*see* Azoturia, Founder, Lymphangitis)
Mosquitoes, 203
Moths, and their ravages, 128; precautions against, 128–9
Mounting, method of, 49, 80
Mouth, soreness of, 90; effect of pulling on, 93–4; one-sided, 112, 114; fineness of, 113; ulceration of, 275
Mouthing, 48–9, 78, 79
Mouth-piece of bit, 94, 114
Mud fever, treatment for, 281
Mules, 71, 186; feed of, 150
Muscle, histology of, 244; sprains, 245 *et seq.*
Music, 50
Musical rides, training for, 50
Mustard, 274, 284

N

NAIL-HOLES, 230,
Nail pricks, 235, 259
Nails, shoeing, 230
Navel-ill, 288
Navicular disease, cause and treatment of, 243, 254–5; as bar to breeding, 287
Neck injuries, 119, 121 (*cf.* Galls)
Neck-strap, 126
Necks, sore, 118
Neigh, 27, 28, 32
Nemesian, 8
Nephritis (*see* Kidney inflammation)
Nervous diseases, 257, 285
Neurectomy, 254, 255, 268
Newcastle, Duke of, 10
Nicking, 194–5
Nictitating membrane, 271
Nitre (saltpetre), 61, 143
Non-slipping shoes, 233
Northumberland, Duke of, 12
Nosebag, 69, 73, 142, 144
Nose-band, 111
Numnah, 101, 103, 105, 106, 127

O

OAKS, the, established, 13
Oat mash, 148
Oatmeal, 86, 153
Oats, 63, 74, 139, 140, 141, 143, 147–50; stowage of, 145, 221; defects in, 149; measuring, 149–50
Obedience, 35–6
Observation, 27, 38, 55
Œstrum of mare, 287, 288
Ointment, gall, 111
Ointments, 250, 303
Olympic Games, 3
One Thousand Guineas, instituted, 13
Operating, aseptic, 257
Ophthalmia, causes and treatment of 280–1
Oppian, 8

Opsonic index, 259
Orohippus, 2
Osmosis, 137, 258
Outward signs as indication of character, 31–3
Overfeeding, 136
Overloading, 91, 92, 122
Over-reach, 243; treatment for, 264

P

Pace, 68
Paces, 84; record, 85
Pack-animals, 71
Pain, the horse and, 20, 36, signs of, 20, 32, 71
Palledicea, 8
Panniculus Carnosus, 188, 194
Paralysis, 204
Parasites, 203–4
Paring the foot, 227
Parker, Sergeant, R.N.W.M.P., and his horse, 24
Parsnips, 152
Parturition, 289
Pasture, 141, 155–6
Patella, dislocation of, 244, 257
Pavements, 233–4
Pawing, 32, 55, 136
Peas, 151
Peat moss, 179, 180
Pelagonius, 8
Pelham bit, 113
Penis, care of, 274
Perforans and perforatus tendons, 247, 248
Periosteum, 100, 245
Peritonitis, treatment for, 279
Perspiration, 63–4, 103, 160, 164, 165, 186
Pharmacopœia, 298
Pharmacy apparatus, 305
Pharyngitis, cause and treatment of, 133, 275
Philip of Macedonia, King, 6
Photographing horses, 134–5
Pica (*see* Appetite, depraved)
Picketing, 72
Pietro (Neapolitan horse-trainer), 53
Pink eye, treatment for, 284–5
Plagiolophus, 2
Plaiting, 189–90, 192–3
Plantar cushion, 223, 226, 228
Pleohippus, 2
Plutarch, 5
Pneumonia, causes and treatment of, 124, 284, 292
Poisons and their antidotes, 304
Poles, 118
Poll, protection of, 71
Poll evil, causes and treatment of, 133 264
Polo ponies, 199
Polyurea (*see* Diabetes insipidus)
Port, bit, 112, 114
Portmouth reversible bit, 113
Potatoes, 152
Poultices, linseed, bran, clay, 274
Powders, condition, 61
Pregnancy, duration of, 287; signs of, 288
Press, the (British and American), condemnation of docking by, 201–2
Presses shoe (or Binds), 235–6
Pressure bandages, 178, 245
Pressure, saddle, 97, 102–3, 108; causes of, 103, 108; test for, 104–5
Pricks, 231, 235, 259
Pride, horses' sense of, 26
Protohippus, 2
Protoplasm, 137
Proud flesh, removal of, 262
Psychology of the horse, 19 *et seq.*
Ptyalism (*see* Slobbering)
Pullers, 93–4, 126, 131
Pulse, how to take, 270
Punishment, 35, 37, 41–3, 82–3
Purgatives, 246, 305
Pyæmia, symptoms and treatment of, 286

INDEX

Q

QUARTER, false, 238
Quartering, 172
Quittor, cause and treatment of, 226, 237, 255

R

RACE-HORSE, condition of, 58; typical routine for training, 65
Race-horses, exercising, 64; feeding, 142
Races, classic, 12–14
Racing, early, 3, 5, 9, 10
Rail transport, 73
Rats, 144, 145
Reactions, 36–8, 46–7
Rearing, 41, 93
Reasoning power (*see* Mind and Intelligence)
Record pacing, trotting and jumping, 85
Records, classical, 14
Rectal injections, how administered, 273
Refusers, 92
Reining-back, 80
Reins, 47, 48, 131–4; check-, 33, 132–3, 188; method of holding, 34, 78, 88–9; over head, 95; under tail, 90–1, 126
Re-shoeing, 228
Respiration, how to take, 271
Respiratory system, 209–10
Rest, 61, 65–6, 155
Rheumatism, causes and treatment of, 161, 213, 280
Rice, 151
Richard II, a favourite horse of, 10
Riders, general hints to, 79–81
Rides, long-distance, 66–8
Riding, 77 *et seq.;* value of, 80–1
Riding-school, 47, 54, 222
Rimington, Gen., 193
Ringbone, 243, 253; treatment for, 254; as bar to breeding, 287
Ringworm, how to treat, 283
Roan Barbary, favourite horse of Richard II, 10
Roaring (or Whistling), cause and treatment of, 133, 272, 283–4; as bar to breeding, 287
Rocking shoes, 233
Rolling, 179
Romans, the, as horsemen, 7, 8
Roofs, stable, 213
Roots, 151–2
Rope-chewing, 183
Rugs, 86, 176–7
Runaways, 41, 94
Running-walk, explanation of, 84
Rupture of blood-vessels, 167
Ruskin cited, 208
Rutherford, Professor, 134
Rutland, Earl of, 10
Rye, 150–1

S

SADDLE cloths, 9, 101, 102, 105, 106
Saddle fitting, 96 *et seq.*, 104 *et seq.*
Saddle galls, 96, 100, 102, 108, 109–11, 120
Saddle pressure, 97, 102–3, 108; test for, 104–5
Saddlery, care of, 69, 106, 126; storage of, 74, 106
Saddles, 78, 96, 102 *et seq.;* early Roman, 8; removal of, 70, 102, 105
Saddling, 105–6
Sainfoin, 158–9
St. Leger, the, established, 13
St. Simon, and his offspring, 13–14
Sallenders, 281
Salt, value to horse of, 74, 141, 154, 161
Saltpetre, 61, 143
Sand-colic, 162
Sandcrack, 238
Sands, care required with exercise on, 64
Sanitation, 72, 75, 182, 218, 220
Santa Paulina, cited, 41

INDEX

Sapræmia, symptoms and treatment of, 286
Saprophytes, 258
Savigear, Professor, 84
Scabies, treatment for, 282
School lessons, 41, 47 *et seq.*
School riding as pastime, 11
Schooling of horse, 10, 45, 47 *et seq.*, 54, 222
Scouring, cause of, 142, 162
Scratches, 165, 169, 259, 281
Sculpture, and the horse, 3 *et seq.*
Scurf, 165
Sea, horses at, 73–5
Sea-sickness, prevention of, 73
Seats, 77–8
Secretions, 164
Seedy toe, cause and treatment of, 238
Senses, 20, 22
Septicæmia, symptoms and treatment of, 286
Serous enlargements, 255–6
Shackles for heel, 72
Shakespeare, 10, 35
Sheath, washing, 171
Shins, sore, 254
Ship, horse on board, 73–5
Shivering, significance of, 32–3, 161; as bar to breeding, 287
Shoe, fitting, 228–32
Shoeboil (*see* Elbow, capped)
Shoeing early horse, 9, 223; faults, 234; principles of, 227–8; special, 232–3; tools, 236
Shoes, examination of, 69, 80, 184; removing, 232; non-slipping, 233; winter, 234
Shooting the horse (*see* Humane destruction)
Shoulder, 100, 101; anatomy of, 118; injuries, 118, 120, 121
Shoulder sprain, 244; treatment for, 250
Shouting, 86, 87, 94, 181
Show-jumping, 27, 81–2
Shying, 6, 31, 37, 40, 49, 87, 213
Sickness, horse in, 139, 270 *et seq.*
Sidebone, causes of and treatment for, 226, 254; as bar to breeding, 287
Side-saddle riding, 83–4
Side-weighting in shoeing, 233
Sight, sense of, 20
Signs, outward, 31–3
Singeing, 187
Skin diseases (non-contagious), 281–2; (parasitic) 282–3
Skin of horse, 43; functions of, 164
Skuthorp, Professor, 46
Sleep, amount required by horse, 66
Slinging, precaution before, 74
Slings, 221–2
Slipping, prevention of, 74, 233
Slobbering, excessive (Ptyalism), cause and treatment of, 275
Smell, sense of, 20, 22, 41
Smoking, 182, 221
Snaffle-bit, 48, 64, 111, 126
Snake-bites, treatment for, 265
Snapping, 206
Snorting, 32
Sociability, 27
Soil, 213
Sole, 224; shoes for dropped, 233
Solomon, King, chariot and saddle-horses of, 3
Sores, prevention and treatment of, 108 *et seq.*, 120 *et seq.*, 261
Spavin (or Jack), 243; cause and treatment of, 250, 253; as bar to breeding, 287
Spavin, bog (*see* Bog)
Speedy-cut, 264
Splint, and treatment for, 242, 253
Sprains, 241, 245 *et seq.*; detection and treatment of, 242–4, 246
Spurs, 7, 82–3
Stable, bad habits in, 183, 204–7
Stable construction, 209 *et seq.*
Stable economy, 136, 142, 181 *et seq.*
Stable impurities, 179, 180, 212
Stable management, 59, 60, 136
Stable, site of, 212–13

INDEX

Stables, old, improvements to, 221

Staggers, causes and treatment of, 285

Stalls, 74, 182, 217, 219

Standard weights, 305–8

Standing still, 50

Sterilization, 260

Stings, treatment for, 265

Stirrup leathers, 108

Stirrups, 9, 107–8

"Stodge," composition of, 142, 147

Stomach, diseases of, 61, 140, 276

Stopping the feet, 183

Strains, 178, 241, 245

Strangles, 272; treatment for, 285

Strapping 167, 172

Straw, 146, 179, 180; stowage of, 221

Stringhalt, cause and treatment of, 241, 286; as bar to breeding, 287

Stumbling, 132, 237

Suffocation, 211

Sugar, 55, 154

Summer itch, 281

Sun, protection from, 71, 174

Sunstroke, treatment for, 285

Superiority, 33–5

Suppuration, 237

Surgery, aseptic, 260, 263

Suspensory ligament, 247

Sweat, 64, 164, 186

Sweat-pads, 119

Swedes, 152

Swellings, 255, 256

Swimming horses, 76

Swishing, 32, 90

Synonyms of drugs, 298 *et seq.*

Synovial enlargements, treatment of, 255

T

Tablets for hypodermic purposes, 302

Tacitus, 8

Tail, care of, 74; bandaging, 75; use of 90, 193–4; washing, 170; plaiting, 171, 192–3; banging, 175, 191; straightening, 194–5; docking the, 195–202; diseases of, and treatment for, 202–4

Tails, rubbed and sore, 177, 192, 193, 202

Tandem driving, 88–9

Tapeworm, 278

Tar on legs, removal of, 265

Taste, sense of, 20

Taylor, Norman S., mile record of, 14

Tea, linseed, 153

Teasing, 33, 52, 206

Teeth, the, 114, 293–7; examination 60, 138, 159, 293 *et seq.;* floating (or filing), 293–4; full number of, 294

Temperature, 160, 219; how to take, 270

Tendons, 63, 243, 244; back, 243, 247–8

Tetanus, 259; cause and treatment of 262, 285–6

Texas fever, carriers of, 203

Thinness, causes of, 144

Thorns, removal of, 265

Thoroughbreds, 12, 13 *et seq.*

Thoroughpin, 250, 255

Throat, sore (Pharyngitis), cause and treatment of, 275

Throat-lash, 111, 126

Thrombosis (Clot in artery), treatment for, 280

Throwing a horse, 252

Thrush, causes and treatment of, 169, 179, 180, 237, 239, 265

Thucydides, 6

Timidity in horses, 40, 74

Tinctures, 302

Tips, shoe, 232

Tissues, histology of, 244–5

Tongue over bit, 48, 112

Tools, grooming, 175; shoeing, 236

Tooth, the, 294

Traces, 87, 88, 89, 116–17, 121–2, 124

Tracheotomy, when necessary, 271–2

Train, horses on, 75–6

Trainer, character of, 23, 26

INDEX

Training, principles of, 44 *et seq.*; humane, 45, 53, 80, 125, 126, 131
Transportation, 73–6
Treads, 243; treatment of, 239
Trembling, 32, 41
Tricks, method of teaching, 53–6
Trimming, 187
Triple Crowners, 13
Trocar, 273
Trot, 84
Trotting, 62, 85; position of rider when, 77
Troughs, drinking, 69, 162–3, 220
Tumours, melanotic, 166
Turnips, 144, 152
Tutankhamen, King, 4
Twitch, 252
Two Thousand Guineas, established, 13
Tying-up horse, 94–5, 172, 182, 183
Tympanites, treatment for, 273

U

ULCERATION of mouth, 275
Underfeeding, 91, 136
Urine, 60, 140, 212, 271; retention of, 279
Utero-gestation, 287

V

VACCINES, 259, 285
Van Dyck, paintings of horse by, 11
Van horses, feeding, 143
Vegetable foodstuffs, composition of, 145–6
Ventilation, 75, 209, 210–12, 218
Veterinary pharmacy, 298 *et seq.*
Vices, 37, 183, 204–7
Viciousness, 33, 45
Victoria, Queen, 207
Vincent, Sir Howard, 201
Virgil, 4
Vitamins, 147
Voice, 30, 51, 93

W

WALES, H.R.H. the Prince of, 201
Walk, 63, 77, 84
Walking exercise, 59 *et seq.*
Wall of hoof, 223–4, 227
Walls, stable, 213, 216
War-horses, breeding of, 7–8
Warts, removal of, 282
Washing tail and mane, 170–1
Water, 162; filtering, 162
Water-troughs, 69, 162–3, 220–1
Watering, principles of, 86, 140, 159–62, 221
Weanling, care of, 292–3
Weaving, 141, 206
Weeds, 158
Weight, distribution of, 101; and balance, 117–18
Weights and measures, 305 *et seq.*
Wesley, John, as horseman, 132
West Australian the first Triple Crowner, 13
Westminster, Duke of, 14, 134
Weymouth bit, 113
Wheat, 151
Whiffle-trees, 118, 121–2
Whips, 82–3, 88
Whisks, fly-, 81, 204
Whistling, cause and treatment of, 283–4
White legs, 169
Wild horses, 15 20, 33, 45
Wind, broken, 142; causes and treatment of, 284; as bar to breeding, 287
Wind-sucking, 141, 205
Windgalls, cause of and treatment for, 255
Windows, 182, 211, 216
Winter care of horse, 143, 172

Winter shoes, 234

20

Wolf-teeth, 93, 297
Wolsey, Cardinal, as horseman, 10
Womb, inflammation of, treatment, 286
Wood, gnawing of, 207, 220
Work, 60, 62
World's records, 85
Worms, 60, 141, 154, 193; treatment for and preventive measures, 277–8
Wounds, 100, 102, 108, 109–11, 120; dressings for, 235, 261, 263; aseptic treatment of, 260 *et seq.*; classification of, 261; sewing, 262–3

X

XENOPHON, 5, 6, 7, 86

Y

YELLOW fever, carriers of, 203
Yorkshire boot, 184, 264

Z

ZINC wither pads, 120
Zoology of horse, 2

MADE AND PRINTED IN GREAT BRITAIN
BY GREYCAINES (TAYLOR GARNETT
EVANS AND CO. LTD.), WATFORD, HERTS.
647